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COMPARISON OF THE EFFECTIVENESS OF A 16-WEEK TRAINING PROGRAM WITH A 12-WEEK TRAINING PROGRAM IN THE REHABILITATION OF BLINDED ADULTS AT ST. PAUL'S REHABILITATION CENTER

by

Yvonne Bishop

This study was carried out under an Office of Vocational Rehabilitation research-demonstration grant, project No. 304. It was initiated by the Director of the Catholic Guild for the Blind, the Rev. Thomas J. Carroll, and executed under the supervision of Dr. Hugo Muench, Professor of Biostatistics, Harvard School of Public Health. The opinions expressed in this report are, however, those of the author.

The work could not have been carried out without the cooperation of the staff of St. Paul's. Invaluable assistance was also given by many members of Harvard University, and in particular of the School of Public Health, by members of Tufts University, by St. Paul's consulting staff, by members of the American Foundation for the Blind, by members of the Industrial Homes for the Blind, by members of state agencies for the blind, and by industrial and commercial concerns. With so many persons contributing it is not possible to mention each individual, but grateful acknowledgement is hereby extended to all who participated.

FOREWORD

As Director of St. Paul's Rehabilitation Center, I am pleased at the opportunity to write this prefatory note.

Research which does not answer the question it sought to settle is usually disappointing to the layman, and sometimes to the researcher. But there are those who are perhaps still disappointed that Columbus did not find a new route to the Indies, as probably the explorer was.

This research project founded by the Office of Vocational Rehabilitation and conducted under the guidance of the Harvard School of Public Health attempted to discover whether a 16-week or 12-week course was to be preferred in rehabilitating blind persons. The research effort is complete, the findings have been gathered, and the following summary prepared. Yet it is unlikely that anyone will make conclusions as to which course length is to be preferred. There are those who will be disappointed. I cannot be disappointed. For in the pages of this report are the basis for new examination of programs for blind persons, re-evaluation of numerous courses within any given program, new ideas and possible new experiments which give research its meaning, new tools to be developed in measurement, and a seedbed for research areas.

A brief narrative may interest the researcher in the social sciences: an interesting study could have been found in the interaction between teaching staff and the outside research staff. The teaching staff were for the most part innocent of research experience, and entered into the project with a conscious firm intention that the visiting researchers should be allowed complete objectivity. This began almost as a friendly estrangement. As time went on the unconscious seduction of ideas was evident. A great ambivalence showed itself on the part of the home staff as a natural friendliness combined with a feeling that objectivity must prevail. A consequent ambivalence was soon recognized in the researchers; one saw almost the pattern reaction to acceptance-rejection. The very nature of the research made it essential that the researchers not only know what was going on, but at times sit in and see what was going on. At one period the visitors sat in on staff activities including program re-evaluation; at another point they were no longer sitting in.

Perhaps the narrative merely suggests the desirability of further orientation of a psychosocial teaching staff to research needs and of researchers to the peculiarities of our group. It is, of course, naive to think that one's role relations can be separated out in social situations, or that objectivity demands the absence of emotional involvement. Under the circumstances it is especially remarkable that the research team of the Harvard School of Public Health should have completed a project and a report as scientifically accurate as the one which follows.

In the course of it Harvard's researchers became a part of St. Paul's. For this too, we are grateful.

Rev. Thomas J. Carroll

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COMPARISON OF THE EFFECTIVENESS OF A 16-WEEK TRAINING PROGRAM WITH A 12-WEEK TRAINING PROGRAM IN THE REHABILITATION OF BLINDED ADULTS AT ST. PAUL'S REHABILITATION CENTER

1. INTRODUCTION

1.1. Background

In 1954 Father Carroll, the Director of the Catholic Guild for the Blind in Boston, set up St. Paul's as a rehabilitation center for newly blinded adults. His aim was to provide a rehabilitation service for civilians of the New England states that was similar to the service provided at Avon for the war-blinded.

The training at St. Paul's is not primarily vocational, but is aimed at making each individual more self-sufficient. Instruction in skills, such as mobility, typing and braille, is accompanied by a strong psychological emphasis. One aspect of this emphasis is the "group approach": facilities are available for ten trainees at a time; this group of ten must enter on the same day and leave on the same day, and the length of time is the same for all. The trainees live at St. Paul's during their training period and are only permitted to visit their homes on designated "free" week ends.

Between 1954 and 1958 the training period was set at 12 weeks. This allowed for four groups of ten to be trained during a year, 16 groups during the four-year period. In 1958 the staff felt that a longer training period would be preferable and an O.V.R. research-demonstration grant was obtained to enable them to extend the period of training from 12 to 16 weeks for three years in order to compare the relative merits of the two lengths of program.

This study, therefore, is concerned with comparing two groups of St. Paul's graduates, divided according to the length of training they received. It does not aim at providing an estimate of the effectiveness of St. Paul's training compared with that of any other rehabilitation center. Such a comparison would be extremely difficult because criteria by which effectiveness can be judged must be related to objectives and not only the methods but the objectives of the St. Paul's training differ from those of other rehabilitation centers. The philosophy on which the training is based is described by Father Carroll[1] in a book wherein he has enumerated the many losses that accompany blindness when it afflicts an adult. In discussing what can be done about each loss he indirectly states the objectives of the St. Paul's training. The similarity of outlook as to what constitutes rehabilitation with the views held at Avon after World War II can be gauged by the views expressed by the former commanding officer, Colonel

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[1] Carroll, T. J.: "Blindness: What It Is, What It Does and How to Live With It". Boston: Little, Brown and Co., Sept., 1961.

Thorne,[1] in an article where he describes the rating of 367 blinded servicemen in terms of seven standards (such as ability to orient well, determination to accept the minimum of assistance, etc.). The training at Avon is described by Coates, et al.;[2] the basic course lasted for 17½ weeks including 1½ weeks' preliminary orientation. There was also an accelerated course of 13 weeks and an extended course of 22 weeks according to the abilities of the student.

When the objectives and methods of approach in rehabilitation of the blind differ widely, it is understandable that ideas as to the length of time required should also vary. Alan Blackburn,[3] writing in Zahl's "Blindness", affirms that good orientation cannot be obtained in less than six months and that it takes six months to one year for a blind person to be made aware of the obstacle sense.

Some agencies consider only one aspect of rehabilitation when judging its effectiveness: they are concerned only with the numbers of persons employed. A more penetrating analysis was undertaken by the Veterans Administration.[4] In 1958 they published the results of an interview survey of 500 war blinded. They asked questions regarding blindness and medical factors, marital and family status, education and training, foot travel and braille, and then had a series of 40 statements with which the blind person had to agree or disagree. From his responses to these statements they assessed his degree of adjustment and related it to the responses to the previous questions and to whether the person had received V.R. and E. training. The difficulty with this approach is that it is not possible to tell what the differences between the two groups of persons were before blindness; those who applied and those who did not apply for training might have been quite different types of people.

1.2. Objectives and Methods

The general aim of this study is to investigate whether either 12 or 16 weeks' training at St. Paul's is more effective for most people, or alternatively whether one or the other is more effective for persons having common characteristics of age, sex, vocational background, environmental background, etc.

It is in keeping with the philosophy underlying St. Paul's training to consider the life of a blind person as being divided into three phases: phase 1, sighted life; phase two, blind life

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[1] Thorne, F. H.: "A Statistical Review of 367 Blinded Servicemen of World War II". Outlook for the Blind, 41, pp. 129-136, 1947.

[2] Coates, J. B., Randolph, M. E., Carfield, N. and McFetridge, E. M.: "Surgery in World War II - Ophthalmology and Otolaryngology". Med. Dept.., U.S. Army, Office of the Surgeon General, 1957.

[3] Zahl, Paul: "Blindness". Princeton University Press, 1950.

[4] Knudson, A. B. C., Canning, R., Grant, I. and Bledsoe, W.: "War-blinded Veterans in a Post-war Setting". Veterans Administration, 1958.

prior to training and phase 3, blind life after training. If rehabilitation is effective, phase 3 will differ from phase 2 and resemble phase 1 more closely. In other words, the blinded adult after training will be more similar to the person he was before losing his sight. To determine whether such a change does take place and, if so, whether the change is greater with 12 or 16 weeks' training, many variables must be considered, both those which are capable of change and those which are inherent.

The variables where change is sought can be considered as falling under three general groups, although many are, of course, interrelated. These groups are (a) skill in performing activities formerly carried on in sighted life for which a different technique must be used by a blind person. In other words, an assessment must be made of the trainee's ability to profit by the "skill" courses offered. (b) Satisfactory psychological adjustment to the 20 losses incurred by blindness. This is again part of the philosophy and the methods by which an attempt to reach this goal is made in the so-called "attitude" courses is a somewhat controversial matter. (c) Increased sensory awareness and confidence in the use of the remaining senses. The achievement of this is one of the main purposes for which trainees having any degree of vision are required to wear occluders.

Three approaches have been used in an attempt to measure these variables:

I. Analysis of grades obtained in skill courses at St. Paul's. Here the specific questions take the form:

i. Among the 12-week trainees is there evidence of a "slump" at the 8th week and subsequent slow recovery so that the 12th-week grades are not much better than the 7th? Does such a dip or plateau also occur among the 16-week trainees at the same time? Is there a "levelling off" or a continuous rise after the 12th week among the 16-week trainees?

ii. Considering final grades only, is there a difference between the 12-week trainees and the 16-week trainees? Is the 12th-week grade comparable in the two groups?

iii. There is a considerable distribution of final grades; are these correlated with physical characteristics? If so, does the correlation diminish or increase when the program is extended to 16 weeks?

The difficulty with this approach is not only that the grades themselves are necessarily subjective, and hence a change of instructor may introduce an apparent change that is unrelated to the length of program, but also that performance while at St. Paul's may be unrelated to performance in a different environment. The results of this analysis are described in Section 3.

II. Sensory tests designed to measure functioning during the 2nd, 11th and 15th weeks of training. This was an attempt at a more objective approach. For each test the specific questions were:

i. Does performance improve during the first nine-week period?

ii. Is this improvement continued in the ensuing four weeks?

The difficulties here were that tests had to be developed and no independent means were available of assessing how far they did in fact measure the particular ability they aimed at measuring. As they were only administered to the 16-week trainees the possibility of more accelerated improvement in the first 11 weeks of the 12-week program cannot be assessed. The details of the tests are given in Appendix 3, and the results in Section 4.

III. An interview of past trainees three months or more after graduating. The questionnaire used is given in Appendix 4. The detailed questions asked aim at covering the following broad questions:

i. With which length of course is the trainee more satisfied on the whole? Are there particular areas where most trainees felt more or less instruction would be desirable, and does this vary between 12-week and 16-week trainees?

ii. Does the extent to which the trainee puts into practice those skills that he learned at St. Paul's differ between the two training periods?

iii. Does the extent and nature of the trainee's social activities vary between the two training periods; which most closely resembles his pattern before blindness?

iv. Is the relationship between the trainee and his family changed by the training, and does the extent vary between training periods?

v. Does the interviewer's impression of the benefits of the training to the individual trainee differ between those of one training period and those of another?

The disadvantages of this approach were that reliance had to some extent to be placed on the trainee's opinion of how good his current performance was. Also, the time between leaving St. Paul's and being interviewed differed considerably between the 12-week and 16-week trainees. The results of these interviews are given in Section 5.

This three-way approach was considered necessary as each method had obvious disadvantages inherent in the design of the study. It was hoped that by comparing the results obtained from each method any gross bias could be detected. It would, of course, have been

preferable to have alternated 12 and 16-week groups, but this would have involved great administrative difficulties.

Changes in these variables must, of course, be considered in relation to the persons whom they describe. Some of the physical characteristics of the two groups of trainees were on record and methods of classification were devised. These methods are described and tabulations given in Appendix 1. The two groups of trainees are compared in terms of these physical variables and I.Q. in Section 2, which deals with the composition of the groups on entry to St. Paul's.

2. PHYSICAL DIFFERENCES BETWEEN SAMPLES

This study consists essentially of a comparison between two "samples" of trainees, those who had 12 weeks' training and those who had 16 weeks' training. To evaluate differences in performance during and after training it is necessary first to ensure that the two samples were potentially similar on entry to St. Paul's. In the following section the numbers involved and criteria of selection are discussed and possible sources of initial dissimilarity are examined as far as availability of records permits.

With the exception of the shop course no performance test has been consistently given on arrival. Attempts to develop suitable sensory tests have been made during the grant period, but this does not help in a comparison between samples.

Medical examinations of each trainee on arrival have always been carried out. Throughout the years these have always included examination by the general practitioner in charge of all medical aspects, and by an ophthalmologist. Audiograms have always been taken and referral made to an otologist when necessary. More recently examinations have also been made by a podiatrist and a physiatrist. These have been summarized and included in the "Final Evaluation". The "Final Evaluation" is an individual record prepared on each trainee who obtains a certificate from St. Paul's; one copy is sent to the referring agency and a duplicate copy is kept on file at St. Paul's. This is the main source of reference for information on age, blindness factors and physical disabilities. The policy of including a medical summary was discontinued in Group 21 and for subsequent groups the records of the individual examiners and other intake material have been utilized.

I.Q. tests are also taken by each trainee and the results of these are recorded in the "Final Evaluation".

Possible differences in the composition of the samples considered are thus confined to age and sex, blindness factors, hearing, I.Q. and other physical handicaps.

2.1. Numbers in Each Sample

Until July, 1961 St. Paul's had facilities for only ten trainees at a time. All members of each group of ten entered at the same time; prior to February, 1958 when the grant period commenced they left after 12 weeks; from February, 1958 to February, 1961 they remained for 16 weeks. Thus all members of Groups 1-16 who completed the course had 12 weeks' training, members of Groups 17-25 16 weeks' training. (Numbers per group are given in Appendix 1, Table 1.) Excluding Group 1, 128 persons completed the 12-week program, referred to as "Sample A" in subsequent pages. Similarly, "Sample B" refers to the 75 persons who completed the 16-week program, excluding those in Group 25.

When St. Paul's began it was not well known and it was difficult to obtain sufficient trainees to fill the empty places. Of later years this pattern has changed and there have been more applicants than vacancies for each group. Thus the possibility of selection in later groups may introduce a bias between Samples A and B and is dealt with below under "Screening". The other possible source of bias that needs to be considered is the number of persons who did not complete the program.

2.1.1. Incompletes

In 12 out of 15 cases the reason for an "Incomplete" was illness, and indicates that the trainee was unable to attend a satisfactory proportion of the program, but there does not seem to be any hard and fast rule as to what length of absence was involved. No systematic attendance records were kept, nor were there any reliable records of periods of a few days' illness occurring during the program which were not of sufficient duration for the trainee to be considered "Incomplete" but which nevertheless may have had a significant effect on his progress. There were ten incompletes in Sample A, five in Sample B. Fortunately these numbers are too small to introduce a significant bias.

It should be noted that here "Incomplete" refers to the program as a whole and means that the trainee was not given a certificate of completion. It is also possible for a trainee who completed the program to be "Incomplete" in one or more subjects, but these persons are included in our Samples A and B if they obtained a certificate for the program as a whole.

2.1.2. Screening

Persons are usually referred to St. Paul's by one of the State Divisions of the Blind. The avowed policy of St. Paul's is to give preference to applicants from the New England area, but how far location is given precedence over other factors is not known, and there seems to be a tendency for the geographic spread to become wider with time. It is assumed that both the greater number of applicants and wider geographic distribution is a result of the center becoming better known, although there seems to be a general belief that blindness caused by diabetes is increasing. Unfortunately no records have been kept of referrals who were not accepted so that no information of bias can be obtained in this way.

Following referral by the State Division, or in a few instances private referral, each trainee is visited in his home by the social worker who forms a subjective opinion of the applicant's physical and emotional suitability for acceptance as a trainee and explains the program to him. If the person still wishes to be considered as an applicant, a medical report is requested and any further information which the State Division can supply. This information is collected for each applicant and then the screening committee meets and decides on those who are most suitable. The screening committee consists of the social worker, the physician

heading the medical staff, the psychiatrist heading the psychosocial department and the psychologist, the administrator, the assistant administrator and, for some groups, the administrator's secretary. The director does not attend these meetings, but his approval must be obtained on all decisions made. This is not a mere matter of formality as the director, who originated the "philosophy" of St. Paul's, plays a very active role at this point.

Thus a variety of factors influences the selection of trainees, all of which may contribute to differences between Sample A and Sample B. First there is the wider choice of applicants in later groups. Secondly, the majority of the committee has been with St. Paul's since it started and presumably with experience has become more able to choose suitable persons. Thirdly, the social worker, who is the only person to have had contact with the applicant prior to the committee meeting, has changed several times recently, whereas prospective trainees in Sample A were all interviewed by the same person.

Attempts by discussion with members of the screening committee to define the criteria on which a person is accepted have failed. There seems to be general agreement that the person should be physically fit enough to take the whole program, including such classes as fencing, but the number of persons unable to complete the program because of sickness seems to show that this factor is not really the primary one.

Emotional readiness is another criterion mentioned, but attempts to define this again have failed. Persons have been accepted who have been blind many years on the one hand and persons straight from hospital on the other. It may be argued that emotional readiness is not a question of time, but how it is defined is more difficult to assess. It seems hard to conceive that any person who wants to be rehabilitated is not emotionally ready to be assisted towards rehabilitation. Thus the screening process remains rather a mystery, and could have resulted in considerable differences in the two samples.

2.2. Age and Sex

As most of the persons are referred to St. Paul's by vocational counselors from the State Divisions they are predominantly in the employable age bracket, although St. Paul's does not claim to be a vocational rehabilitation center. The distribution of ages obtained at the time of entering the program is shown in Appendix 1, Table 2, page 2. The average age of 40.7 years for Sample B is a year younger than 41.5 for Sample A, but the difference between groups is not significant ($\chi^2 = 4.55,\ 0.5 > p > 0.3$). Inspection of the table also shows that there is no important difference between the ages of the men compared with the women.

The dormitory space was such that accommodation was only available for seven men and three women. Thus if it were not for unfilled positions and "Incompletes", we would expect each sample

to consist of 70% men. In Sample A we have 75.0% and in Sample B 70.7%, not a sufficiently large difference to bias results. Thus as far as sex and age are concerned the two samples do not differ significantly from each other.

2.3. Blindness Factors

It is part of the philosophy of St. Paul's that there is a qualitative difference between congenital blindness and blindness that occurs in an adult who has grown up sighted. It is this latter form of "adventitious" blindness that St. Paul's deals with exclusively. Apart from the exclusion of those born blind or who became blind as young children, there is no other limitation on the type of blindness. Thus persons with progressive visual deterioration through disease and persons blinded instantly in an accident are both accepted as trainees. There is a possibility that the difference between progressive or sudden blindness may affect a trainee's adjustment; hence the cause of blindness should be considered. Similarly, the duration of blindness prior to entering the training program may affect the trainee's ability to visualize (an integral part of the training program), and differences in this regard between the two groups should be considered. The third aspect of blindness that needs consideration is the amount of remaining vision. As the trainees must wear occluders to shut out any remaining vision during the training period persons accepted usually have much less vision than the 20/200 which constitutes legal blindness in Massachusetts.

Details of the method of classification of these three factors are followed by the distributions of each sample in Appendix 1, pages 3-7. When the six most frequent causes of blindness are considered they comprise 83% of the total; they are diabetes 39%, trauma 11%, glaucoma 11%, detached retina 8%, retinitis pigmentosa 8% and uveitus 5%. This distribution does not vary significantly between the two samples. Some estimate of degree of vision is available for all but ten of the 203 trainees. When these estimates are classified into five categories ranging from "no vision" to "vision greater than 4/200" there is again no difference between the two samples. The third factor, duration of blindness prior to entering St. Paul's, does show a difference; 5% of Sample A were blind for less than one year, 28% of Sample B. This difference is readily explained if it is assumed that there was initially a "back-log" of persons who had been blind for more than a year who wanted the type of training St. Paul's offers. Alternatively it may reflect a preference on the part of the screening committee.

2.4. Hearing

Of the senses remaining to the blind person one of the most important, if not the most important, is hearing. Fortunately this is one area in which an objective measurement of the trainee's ability is available in the form of an audiogram. For purposes of this study an attempt has been made to classify these graphs into

nine homogeneous groups as described in Appendix 1, pages 7-12.

Without going into details here of this classification some of its limitations and of the audiogram should be mentioned. It is hoped that the nine groups represent varying degrees of seriousness of loss, but this has not been established. It should also be borne in mind that very little seems to be known of the relation between hearing acuity as measured by an audiogram and the efficiency with which a person is able to use this hearing for such purposes as (a) recognition of sounds when they are presented singly in quiet surroundings, (b) discrimination of sounds against background noises, (c) localization of sounds in both the horizontal and vertical planes. These are all very important areas for the blind trainee. Studies such as those by Wallach, et al.[1] on the precedence effect in sound localization assume "normal" hearing. Information on whether these results are applicable to persons suffering a hearing loss, or on how great a hearing loss must be before it affects the functioning of the individual seems to be lacking. A further area where the usefulness of a conventional audiogram is not known is the so-called "facial vision". A good deal of work has been done in this area by Griffin,[2] who related this ability to the ability of bats to discern objects by emitting high-frequency sounds up to 130,000 c.p.s. and is currently being carried out by D. Calender of M.I.T. Further work by Cotzin, Dallenbach and others[3-6] with blind and deaf-blind persons confirmed that the ability to detect obstacles is a function of hearing. Although it has been observed at St. Paul's that the ability of trainees to use "facial vision" varies considerably between persons, unfortunately no records have been kept of individual abilities in this regard, so it is not possible to see whether a projection of the general pattern of the audiogram might give an indication of relative abilities.

A third limitation is the accuracy of the audiogram itself. Sataloff[7] claims that at least two and preferably three audiograms "are necessary to establish a base line with which future comparisons can justifiably be made. These should be independently done at varying intervals, either during one day or several days apart".

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[1] Wallach, Hans, Newman, Edwin B., Newman, Mark B. and Rosenzweig, Mark R.: "The Precedence Effect in Sound Localization". Am. J. Psych. 62, 315, 1949.

[2] Griffin, Donald R.: "Echoes of Bats and Men." New York: Doubleday, 1959, 156 pp.

[3] Cotzin, M., Dallenbach, D. M. and Supa, M.: "The Perception of Obstacles by the Blind". Am. J. Psych. 57, 133-83, 1944.

[4] Dallenbach, K. M. and Worchel, P.: "Perception of Obstacles by the Deaf-Blind". Am. J. Psych. 60, 502-53, 1947.

[5] Cotzin, M. and Dallenbach, D.M.: "The Role of Pitch and Loudness in the Perception of Obstacles by the Blind". Am. J. Psych. 63, 485-515, 1950.

[6] Ammons, Carol H., Dallenbach, K. M. and Worchel, P.: "The Perception of Obstacles Out of Door by Blindfolded and Blindfolded-Deafened Subjects". Am. J. Psych. 66, 519-553, 1953.

[7] Sataloff, Joseph: "Industrial Deafness". Blakiston Division, McGraw-Hill, 1957, 202.

There was no difference in the distributions of Sample A and Sample B between the nine categories of hearing. What is remarkable is that only 52 out of 204 persons did not have a hearing loss of at least 15 db. in at least one ear. Between 55 and 60 had a loss of 30 db. or more, 27 of them in both ears.

2.5. Intelligence

Some time during the program the psychologist administers the Verbal Scale of the W.A.I.S. I.Q. test individually to each trainee who has not already been tested by the Division of the Blind. For the earlier groups the older form of the Weschler-Bellevue scale was used; from Group 18 onwards the revised W.A.I.S. was adopted. No attempt has been made to distinguish between those trainees tested at St. Paul's and those tested elsewhere, but it is believed that the majority fall into the former category. In one instance a trainee, who was tested prior to St. Paul's and received a score of 105, when tested at the end of the program scored 136. In this instance the latter value has been used as it was believed to be more indicative of the trainee's potential ability and his low score was attributed to nervousness at the time of the test. There is of course the possibility that he had meanwhile learned some of the answers that he did not know previously. This case is cited because it does indicate two possible reasons for the scores obtained to be unreliable: if tested near the beginning of the program trainees are very often anxious and this may affect their performance detrimentally; if tested towards the end when they know each other well, they may be more inclined to discuss the test among themselves so that those tested last would have gained some help from those tested first.

Only the Verbal Scale is administered as the W.B. Performance Tests require vision and at present no well-standardized performance scale is available for the blind, although such a scale is being developed at Purdue University. It is the "Purdue Non-Language Intelligence Test" and has been designed because it was felt that blind persons "tend to develop a so-called 'verbal veneer'; verbal comprehension is demonstrated without a real understanding of the concept in question."[1] This objection to a verbal scale seems to apply more to congenitally blind persons, than to the "adventitiously-blinded" adults at St. Paul's.

An attempt was made initially to investigate the correlations between the different components of the test to see whether the blind person found any particular verbal test more difficult. It was also thought that it might be possible to investigate whether performance in specific skill subjects, e.g., braille, was more closely correlated with particular components than with the full scale. Investigation, however, showed that of the six components of the scale, in most instances only five were available for a particular trainee, the full number being available for only 31 trainees in Sample A. As the component omitted differed between

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[1] "An Investigation of Vocational Success with the Blind." O.V.R. Project No. SP-188 (Grantee designation PRF 1588), Progress Reports 2 and 3.

trainees, any breakdown was not possible. (Prorating five components to give a full score is, of course, a valid procedure for usual purposes and when these tests were administered no thought of further analysis was in mind.)

The distribution of the two samples is given in Appendix 1, Table 10, page 12. Sample A with an average I.Q. of 113 is significantly higher than Sample B with an average of 107 ($t = 2.75$ with 186 degrees of freedom, giving $p < 0.01$). It is commonly believed that the two forms of test used are comparable and would not account for this difference.

2.6. Other Handicaps

Apart from blindness and the hearing losses previously discussed many trainees have other medical problems. Where these consist of disabilities or chronic illness they have been recorded in the medical section of the "Final Evaluation".

Unfortunately from Group 21 onwards medical histories were not included in the "Final Evaluation" and for these trainees the only source of information is the collection of "intake material". It is strongly suspected that these records are far from complete; indeed the reason for dropping the medical history from the final evaluation was that, for the most part, much of the information obtained was dependent on the trainee's memory and willingness to divulge information. It is thought, however, that major apparent handicaps were probably recorded and so an attempt has been made to abstract these and roughly classify them.

Appendix 1, Table 11 shows that there is no gross difference between the two samples as shown by the available data. Any test of significance would be unjustified in view of the quality of the information available, but it does seem desirable when considering the performance of the trainees to realize that only about 30% are not suffering from other disabilities, in addition to the large number with hearing losses.

2.7. Summary of Physical Differences between Samples

Of the physical characteristics considered only two showed any difference between the 12-week trainees and the 16-week trainees on arrival at St. Paul's; the former sample had on the average been blind for a longer period of time and had a slightly higher I.Q. score.

These comparisons were made to determine how closely the two samples resembled each other initially. The wide ranges found in most of the characteristics led to further comparisons in Section 3 where an attempt was made to see how far they were correlated with the trainee's performance as reflected by his grades, and whether the longer program tended to augment or diminish the relationship.

3. GRADE DIFFERENCES BETWEEN GROUPS

In each skill subject each trainee is graded every week, and is also awarded a final grade at the end of the program. As far as is known, the basis for these grades has not changed between the 12-week and 16-week programs. Lesson plans for the 12-week program were not available, but those for the 16-week program have been summarized for each skill subject, together with each instructor's criteria for grading, in Appendix 2. Examination of these lesson plans and discussion with staff members lead to the conclusion that very little new material was introduced with the additional four weeks; in some instances the material given was spread over a longer period and in others the last four weeks were largely devoted to revision and putting into practice the skills learned earlier. Thus with the same basis for grades, the same grading system, and the same course content it might be expected that the final grades would afford a means of comparison between the two samples. Several factors combine, however, to render such a comparison invalid. There were, in some subjects, frequent changes of instructors and in Group 22 a system of five-weekly reports was introduced. These are discussed in Sections 3.2 and 3.1, respectively. The final grades are nevertheless used as the best available indication of a trainee's performance while at St. Paul's and these are analyzed in Section 3.3, where a description is given of the method used to compute an average over all subjects which is weighted to take account of differences in the relative importance of different subjects and adjusted to eliminate differences between instructors. Section 3.4 deals with analysis of the weekly grades for selected groups of trainees.

In addition to the skill subjects, the trainees also spend a considerable portion of their time in "attitude courses". An attempt is made to assess the trainees' performance in these ungraded courses in Section 3.5.

3.1. Grading System

The grading has always been on a five-point scale as follows:

Superior	4
Above average	3
Average	2
Below average	1
Poor	0

Until Group 22 most instructors kept a record of weekly grades for their subject for each trainee (together with weekly comments) until the end of the program when they were assembled in the "Final Evaluation" dossier on each trainee. The Final Evaluation also included a final grade and comment for each skill course, together with a verbal description of the trainee's general performance compiled as a result of discussion by the staff as a group. Generally, this group discussion preceded the composition of a final comment and grade for each course by individual staff members. It could

be that this discussion was thus responsible for some of the correlation found between courses of widely differing nature (see below). These Final Evaluations were primarily prepared for the benefit of the referring agencies, but a copy was also kept on file at St. Paul's.

In Group 22 this system was changed for a variety of reasons, one of the most pressing being the desire of the referring agencies to know something of their client's progress before the program ended. The new system involved preparation of brief reports at the end of the fifth and tenth weeks as well as at the end of the program. These brief reports included average grades for the five weeks and comments where needed. In an attempt to ensure greater objectivity two grades were now given for each subject, one for accomplishment and the other for attitude. In the following analysis only the former has been considered as this was the basis on which grades were avowedly based in earlier groups. The new attitude grade was introduced as staff members did not like to award poor grades to a trainee who was trying hard but not meeting with much success and also because it was decided to make these five-weekly grades known to the trainee as soon as they were available. Formerly a trainee could obtain his grades by asking an individual staff member for them, but many did not do so.

With different administrators the whole matter of awarding grades and informing trainees of them has come up for much discussion and this may have influenced the grading habits of even the staff members who had been with St. Paul's for a long time and thereby formed a consistent pattern of grading. In any event the term "average grade" is not really applicable to the final grade in each subject as each instructor exercises discretion in "rounding off" the computed average. Thus the weekly grades and the final grades have been treated separately in the following analyses. For this reason, and because the policy regarding treatment of zero grades obtained as a result of illness or other absence (as distinct from zero grades awarded for poor performance) did not seem to be very clear-cut, no attempt has been made to construct a final grade in those instances where weekly grades were available but, by some oversight, the final grade was not.

3.2. Changes in Instructors and Program

In Table 3.1 the skill courses are listed. In adjacent columns the groups in which the course started and every subsequent group where the instructor was changed is given. As Group 1 has not been considered at all in this study, the earliest courses are shown as starting in Group 2. It will be observed that two entirely new courses were introduced after the 16-week program began, namely Sensory Training and Spoken Communication. For these courses, of course, no comparison between Samples A and B are possible. The only skill courses where there has been no change of instructor are Mobility, Fencing, Housekeeping, and the pair of courses, Visualization and Orientation, which, because they

have been taught by the one instructor, are difficult to separate (see course content and basis for grades, Appendix 2).

In some courses the change of instructor coincided with the introduction of the 16-week program (in Group 17) or shortly thereafter, and this necessarily invalidates comparison of grades between Samples A and B for these courses, and hence comparison of final averages of all subjects (which would include these courses). The change of instructor not only introduces a difference in grading criteria but, in many instances, in course content. Where this is known to have occurred, it has been mentioned in Appendix 2, but as many instructors who left either had no lesson plans or took their plans with them it is difficult to assess how far change of instructor implies change of course content. In this regard it should also be mentioned that not only were there four different administrators subsequent to Group 17 but also at least four different social workers; and although neither of these persons ordinarily are concerned with giving grades, their opinions and advice could appreciably affect the attitude of the staff towards particular trainees. If, for instance, the social worker expressed an opinion that a particular trainee needed as much encouragement as possible, it is conceivable that this would influence a staff member who was hesitating between alternative grades.

In Table 3.2 the number of 40-minute periods spent per week by each trainee in skill courses is given. This shows a gradual increase from 33 periods in Group 2 to 40 periods for men and 42 for women in Group 24. To these must be added about ten periods spent in "Attitude" courses and other ungraded courses, thus bringing the total to about 50 periods of instruction per week, or about 33 hours. As the trainees are instructed in groups of varying size for different subjects, it is not possible to arrange a timetable which does not include "free" periods for some or all trainees each day. This means that some instruction is necessarily given in the evening and it is possible that fatigue would influence the trainee's performance in these subjects. In some subjects, such as housekeeping, the time of the day at which a class occurs influences the choice of the exercise given. Neither of these considerations has been investigated, nor has the use of "free" periods which the trainees may spend as he wishes, although he is expected to do his own laundry and is given assignments for various courses. It is of course possible that increasing the number of hours' instruction per week has disadvantages in terms of fatigue and the amount of time available for completing assignments.

3.3. Final Grades

3.3.1. Computation of Overall Average Skill Grade

In the preceding section the sources of variation considered were mainly those which would introduce a change from one group of trainees to the next. There is, however, another

factor to be considered: within one group of trainees there is a large variation in the average grades awarded in each particular course. The analysis of variance for the final grades awarded in 14 courses in Sample A shows this:

Source of Variation	D.F.	Mean Square	F
Between 14 courses	13	49.61	51.36
Between trainees within 14 courses	1378	0.97	

It is nevertheless necessary to obtain an overall measure of each trainee's accomplishment in skill courses while at St. Paul's. Clearly the average of his final grades in each subject is not a very good measure. The tendency of some instructors to utilize only the upper range of the grade scale is shown in Figure 3.1 where histograms are drawn based on all the final grades awarded in each course by each instructor throughout the time he or she taught at St. Paul's. These show each instructor's average grade (vertical lines) and indicate the number of trainees from which the percentage distribution has been computed. (The 16-week groups are shown by shaded histograms and are separated from the 12-week groups even when there was no change of instructor.) An attempt has been made to remove some of the variation between instructors by the rough method of finding the difference between the instructor's average grade and the nominal average of 2 and then subtracting (or in some instances adding) this difference to each grade awarded by the instructor. In other words, the position of the histogram on the grade scale has been adjusted, though no alteration in shape has been made.

These adjusted grades have been used to compute the overall skill average, but a weighted mean instead of a straight average has been used. The weight used was the number of periods spent per week in each course as it was believed that this was quite a good indication of the relative importance of each course. The number of periods spent in each course has been relatively constant from group to group (see Table 3.2).

The effect of adjusting and weighting the final overall grades is shown in Figure 3.2 where the average for each group of trainees has been computed from both types of individual averages: (a) unweighted mean of raw final grades; (b) weighted mean of adjusted final grades. The most notable effect has been to diminish the grades of the last two groups compared with those of previous groups. There is still, however, an increase in Group 22 when the new grading system was introduced -- this is surprising as one of the main purposes of separating skill and attitude grades was to enable a more objective evaluation of skill to be made that was not influenced by the idea "he tries so hard, it would be a shame to give him a poor grade". The inference to be drawn would be that there were more trainees with poor attitudes than good attitudes, but this does not agree with impressions gained from

discussion with the staff and reading their evaluations of trainees. It is also notable that Group 12 obtained the best group average (adjusted) grade. This group only had six members.

Before proceeding to comparisons between the adjusted average grades and physical factors, it would be appropriate to mention that the final grade, however weighted or adjusted, is open to criticism as an indication of the successfulness of the training. The members of the staff when considering how effective their teaching has been are more apt to cite an instance where a trainee has shown marked improvement during the course, even though his final grade may not be above average, than they are to speak of a trainee who performed well throughout the course and finished with "superior" grades.

This idea was substantiated by a procedure adopted at the end of the evaluation of Group 22. Staff members were asked to assign a grade of "above average", "average", or "below average" to each trainee, not with regard to their own particular course but on what they believed the trainee's overall level of achievement to be. These grades were averaged and a rank order of achievement obtained for the nine trainees. Staff members were also asked to rank the trainees according to how much they believed each trainee had improved during the program. Of the 11 staff present, nine did this completely and their rank ordering was compared. The coefficient of concordance W was 0.2568 which, although not high, does show a significant level of agreement among the staff as to which trainees had improved most ($\chi^2 = 18.49$ with 8 d.f., $0.02 > p > 0.01$). The average adjusted grades were also computed and a third ranking by grades was obtained.

The Spearman rank correlation coefficients r_s for the three possible combinations of these three rankings were as follows:

	r_s	Significance at 5% level
Achievement and grade	0.69	Significant
Achievement and improvement	-0.24	Not significant
Grade and improvement	-0.42	Not significant

As expected, the grades were significantly correlated with achievement but not with improvement - in fact, if anything, there was an inverse relationship.

Unfortunately, no measurements were available for assessing improvement during the program. After consulting with the staff, the idea of using the difference between the grades obtained in the first weeks and those obtained in the last weeks was abandoned as the staff did not have great confidence in the grades they awarded in the first few weeks when the trainees were strangers to them. The weighted and adjusted average grade is thus the best measure available and will be used in all subsequent analyses, being referred to simply as "adjusted average" grade. The overall effect of this adjustment is shown for both 12-week and 16-week groups in Figure 3.3.

3.3.2. Comparison of Final Grades

In Figure 3.1 the 16-week groups are shown by shaded histograms and are separated from the 12-week groups even when there was no change of instructor. The total number of instructors teaching each course throughout the seven years is shown at the side of each line of histograms. It is possible to pick out those subjects where the instructor did not change and compare average course grades, $\bar{x}$, for the total number of trainees graded, n.

	Sample A		Sample B	
	n	$\bar{x}$	n	$\bar{x}$
Mobility	128	2.34	75	2.51
Fencing	122	1.99	75	2.21
Visualization	128	2.62	75	2.82
Orientation	87	2.83	75	2.71
Housekeeping	128	2.77	75	2.64

When consideration is confined to five courses with no change of instructor, a higher final grade is achieved in Sample B in three courses, in Sample A in two courses; there is even a reversal between two courses, visualization and orientation, taught by the same instructor. Thus, there is no indication from these courses that Sample B with four extra weeks' training reached a higher level of achievement than Sample A.

For reasons already explained, it is not feasible to compare samples in those courses where there was a change of instructor. The method of computing the adjusted average is such that both samples have a mean grade of 2.0. This average was computed as a measure reflecting achievement in the skill courses for use in comparisons with physical factors of the trainees, attitude courses, sensory training tests and questionnaire results.

3.3.3. Associations between Adjusted Averages and Other Factors

Considerable effort was made to see whether there was any correlation between level of achievement as evidenced by grades, and physical or other characteristics of the trainees. Not only would this be an interesting finding in itself, but it is conceivable that if trainees are divided into categories according to a particular variable that some categories might do better with a 12-week program and some with a 16-week one. Such an effect would not necessarily be obvious from a comparison of the averages of Sample A and Sample B. It could be detected as a change in the slope of the regression line relating grade and other variable. Another effect of the difference in length of program might be a variation in the extent to which the grade obtained was dependent on the variable in question. This would be reflected by a change in the correlation coefficient.

For those variables that consist of categories rather than continuous measurements it is necessary to use the techniques of

analysis of variance to determine whether one category has a significantly different grade from another. Thus, the table below gives either the F-ratios or the correlation coefficients (r) obtained when comparison was made between physical characteristics and adjusted grades for Sample A.

Characteristic	Sample A (128 trainees)	Sample B (75 trainees)
Cause of blindness	F, n.s.	
Degree of blindness	F, n.s.	
Hearing	$F_{8,112} = 3.52$**	$F_{8,65} = 2.40$*
Duration of blindness	r, n.s.	
Sex	t, n.s.	
Age	$r = -0.450$**	$r = -0.301$**
I.Q.	$r = 0.417$**	$r = 0.278$*

As age and I.Q. were found to be significant at the 1% level, the corresponding correlation coefficients were found for Sample B and both the slope of the regression lines and the correlation coefficients compared between samples. No significant differences were found. Thus, it may be said that the rather weak associations between adjusted grade and age and between adjusted grade and I.Q. did not differ between the two samples.

The average grades for each hearing loss category were also computed for each sample but showed no great differences in distribution. In each sample the highest average was obtained by the trainees in the "no hearing loss" category.

Besides comparing adjusted average grades with physical factors their relationship with some of the component final grades for individual courses was also examined to see whether individuals showed wide variations in performance between courses. Correlation coefficients between adjusted averages and individual courses were as follows for Sample A:

Shop	0.684**
Housekeeping	0.649**
Mobility	0.706**

These highly significant correlations were much greater than would have been expected had the correlation only been due to the inclusion of the individual course grade in the final grade. For instance, for mobility the correlation, r, due to this effect would be of the order of 0.125. [If w is the weight of the mobility grade (in most groups = 5/40) and σ_m^2 the variance of the mobility grade alone, σ_y^2 the variance of all grades including mobility, the correlation coefficient would be $(w\sigma x)/\sigma_y$ if mobility were not correlated with the other grades, and as $\sigma_x/\sigma_y \longrightarrow 1$, $r \longrightarrow w$.]

Note: Throughout the remainder of this report, one asterisk indicates significant at 5% level, two asterisks significant at 1% level and n.s. = not significant.

It may therefore be concluded that there is a very high correlation between the adjusted average grade and the final grades given in individual subjects. In view of this, it was not considered necessary to compare the final grades for every individual course with the physical characteristics of the trainees, but some special comparisons for particular courses were carried out and are summarized below.

3.3.4. Correlations of Final Grades for Individual Courses and Other Factors

The courses selected for special comparison were mobility and housekeeping, as these had been taught by the same instructors throughout, shop because the sex analogy was similar to housekeeping, and braille because of possible psychological implications. Comparisons were made, using data from Sample A, with physical characteristics of the trainees and with other courses. Sample A was used as the computations were largely performed before Sample B was completed and it was during this time that clues were being sought as to which were the most important variables to measure.

3.3.4.1. Mobility

Comparisons were made first with physical variables. The correlation between mobility grade and age was highly significant ($r = -0.363$) and only slightly less than the correlation between adjusted average and age. The correlation was slightly less for females than for males, as was the average grade, but neither of these differences was significant.

When blindness factors were considered, there was again no association between mobility grade and either degree or duration of blindness, but an F-ratio of 2.38 showed a significant difference according to cause of blindness, those persons blinded by retinitis pigmentosa obtaining the highest grades. The lack of association with degree of blindness is interesting in view of the phrase "travelling vision" that is often used to imply that a certain minimum of vision is necessary to enable a blind person to travel alone. The difference with cause of blindness is more difficult to understand as it does not seem to be a reflection of age differences (the average age of the 12-week trainees with retinitis pigmentosa is 39 years, very close to the average of 41 years for the whole sample).

Another physical factor that is believed to be important in mobility is balance. For Groups 3-20 the mobility instructor conducted a "walk-the-plank" test; the distance that the trainee was able to walk along a wooden board 2 3/4 inches wide and raised one inch from the ground was recorded. This distance was found to be correlated with mobility grade, the values being $r = 0.331$ for a test given near the beginning of the program and $r = 0.384$ when the test was repeated later in the program. It was also observed (a) that the increase in distance walked between the first and second tests was greater for those obtaining higher grades in mobility,

and (b) that diabetics did not do as well on this test as non-diabetics, the difference being marked even when the sexes were considered separately. In view of this, it was unfortunate that the week of administration of the test was not sufficiently consistent to enable comparisons to be made between Sample A and Sample B. The test was abandoned when it was decided that each trainee should be examined by a qualified physiatrist who looked for balance or coordination difficulties.

Hearing was also compared with mobility and again it was found that those trainees in the category "no hearing loss" obtained significantly higher mobility grades than did those with hearing losses.

The final mobility grade was also compared with final grades in closely allied subjects and the correlation coefficients obtained were

Fencing	0.588**
Kinesthetics	0.531**
Orientation	0.608**

All of these were highly significant correlations, but so, too, was the correlation with braille of 0.427. Although such physical attributes as balance and hearing ability could account for the close agreement with the first three, these would not seem to be as pertinent to the comparison with braille. It would seem logical that the underlying cause for agreement between these two subjects might be general intelligence, but the correlation coefficient between mobility grade and I.Q., although highly significant, was only 0.256.

This close agreement between grades obtained in mobility and in other courses whether of allied or non-allied subject matter confirms the assumption that the adjusted average grade is an adequate measure of the trainee's performance. The comparison of physical factors with mobility or adjusted grade leads to very similar conclusions; performance is correlated with age, hearing and to a lesser extent I.Q. and is independent of degree or duration of blindness. Cause of blindness has some effect on mobility grade but not on the adjusted grade.

3.3.4.2. Braille

Comparison of braille grades and age again showed a negative correlation with age. Comparisons by sex showed that females obtained better grades than males. There was again a low but significant correlation with I.Q. and no differences between the blindness factors, cause, degree and duration. The braille grades are difficult to analyze not only by reason of different instructors but also because some trainees have a knowledge of braille on arrival. The relationship with age and sex still applied, however, when only those with no previous knowledge of braille were considered.

Some trainees find this subject very difficult and claim that they "cannot feel the dots". Two hypotheses may be advanced: (a) they have less sensitive fingers than those who read braille easily or (b) they reject braille because it is a symbol of blindness. It seems to be important to determine which of these is the true explanation in the majority of cases before the successfulness of the training can be evaluated. An approach to hypothesis (a) is the development of an independent measure of sensitivity of touch and this is discussed in Section 4 below. No measurements were available for testing hypothesis (b), but this was approached indirectly by considering in detail those eight trainees of Sample A who had a final braille grade of 0 or 1.

One of these was a trainee with an I.Q. of 72 and a poor educational background who could read the braille symbols well but could not understand what she read. Another had a history of stays in mental hospitals and was considered by the staff to be "confused". The remaining six were all diabetics. All except one had been diabetic for more than 20 years and had a medical history of neurological involvement; the one exception complained often of lack of sensitivity in his fingers and obtained good grades and showed a satisfactory attitude in all the other courses. These findings would seem to indicate that hypothesis (a) does have some validity. If this is indeed true then the large proportion of trainees who said that they would have liked less training in braille may be explained (see Section 5.2.4.2) in terms of their ability to profit by the instruction offered.

3.3.4.3. Housekeeping and Shop

Final housekeeping grades were found to be uncorrelated with any of the blindness factors, cause, degree or duration. They were inversely correlated with age, r = -0.365. Comparisons were also made with age and with shop grades for each sex separately but were found not to differ between the sexes in the amount of correlation. The values obtained were as follows:

	No. of trainees	Correlation of Housekeeping with Age	Shop
Males	96	-0.358**	0.479**
Females	32	-0.425**	0.553**

The average grades were as follows:

	Housekeeping	Shop
Males	3.04	2.05
Females	2.91	1.41
Difference	0.13 n.s.	0.64**

and show that although males obtained significantly higher grades than females in the shop course, there was no significant difference in the grades obtained by the two sexes in the housekeeping

course. This is rather a surprising conclusion as to the observer it seemed that the men objected to the housekeeping course just as much as the women objected to the shop course.

3.3.5. Summary of Final Grade Comparisons

From all these comparisons it may be concluded that the adjusted average grade is in general representative of the trainee's performance in all courses as the agreement between grades obtained in various courses is high. Comparisons with physical factors show no consistent associations with blindness factors, cause, degree or duration. There does seem to be an inverse relationship between age and adjusted average grade which is the same for both sexes and both samples. Those with no hearing loss greater than 15 d.b. consistently obtain higher grades than those with a loss. The amount of association with I.Q. varies between subjects but not between samples. It does not seem to be as important a factor as age. These considerations are of importance when attempting to determine whether particular persons are able to profit from a 12-week course as distinct from others for whom 16 weeks would be desirable. Insofar as final grades can be used as an indicator of differences between the two lengths of program the conclusion must be drawn that no differences are apparent. There are no apparent changes in the association between final grade and the physical variables which were investigated.

3.4. Weekly Grades

The grades awarded in each skill subject each week to each trainee have been examined in several ways to see whether any constant patterns existed and, if so, whether they changed between the 12 and 16-week programs. One of the reasons for extending the length of the program was that some of the members of the staff felt that the trainees' rate of progress fell off at the 8th week and that they remained on a "plateau" until just before the end of the 12th week. Consequently, an attempt was made to see whether the grades reflected this behavior. Graphs were plotted both of individual trainee's weekly grades and of group weekly grades. These were averaged over all skill subjects. No similarity was discernible between trainees of the same group or between one group and another. It was suspected that the tendency of different instructors to use different sections of the grade-range could account for some of the erratic patterns observed and so it was decided to consider each subject separately.

The first stage was to average the weekly grade for each subject over the trainees comprising a group. When this was done, no consistent pattern from one group to the next was discernible. As it was believed that the weather at different times of the year might affect the trainee's performance in subjects such as mobility, the next stage was to obtain yearly averages. For the 12-week program the last four groups available were chosen, Groups 13, 14, 15 and 16. For the 16-week program the second year was chosen rather than the first when perhaps any pattern would not have been

so firmly established as the staff was still experimenting to find the best way to utilize the additional four weeks. Thus, the three groups chosen were Groups 20, 21 and 22. Adequate data were available for eight subjects and are shown in Figure 3.4. Of these subjects mobility, fencing, shop and housekeeping had each been taught by the same instructor from Group 12 to 22 inclusive. The remaining four, kinesthetics, braille, typing and techniques of daily living (T.D.L.) had at least one change of instructor during this period and the groups when the instructor changed are indicated in Figure 3.4.

Of the four subjects which were taught by the same instructors throughout the period considered, mobility shows a marked increase after the 12th week with not too much difference in the earlier part of the program. Fencing shows that higher grades were obtained with the 16-week program, but the difference began to be apparent prior to the 12th week. The remaining two subjects, shop and housekeeping, show that in general lower grades were obtained by the 16-week trainees than by the 12-week trainees.

The changes in instructors make comparison of 12 and 16 weeks difficult, but the remaining four subjects were included so that the general trend might be examined. (It should be noted that grades were not generally available for the last week of the 16-week program.) In all four subjects, kinesthetics, braille, typing and T.D.L. (Techniques of Daily Living drills), a steady rise throughout the 16 weeks is apparent and in all these, except kinesthetics, there is a greater rise than with the 12-week program. In fact, with the 12-week program, the braille and typing grades show hardly any change in the 12 weeks.

There does not seem to be any evidence of a "slump" at the 8th week. Plateaus do seem to occur in some of the graphs, for instance between the 5th and 8th weeks in mobility, but these do not correspond with the timing of plateaus in other subjects and, as they are not apparent when groups are examined separately, they must be regarded as fortuitous.

The dissimilarity between subjects would seem to indicate that the weekly grades do not reflect a general learning pattern with spurts occurring repeatedly at the same time in the program. Examination of years other than those drawn weakened rather than strengthened the evidence given by the mobility grades that trainees attain a higher level of achievement in 16 weeks than in 12 and as this evidence is contradicted by other subjects, the overall impression to be gained is that there is no difference between the 12 and 16-week program.

3.5. Attitude Courses

3.5.1. Content

In addition to the skill courses previously discussed, the trainees also spend time each week in a number of "attitude" courses. No detailed outlines of these courses are available, with

the exception of Techniques of Daily Living, Principles, but the following brief explanations are those given to the referring counselors in the Final Evaluations.

Attitudes and Analysis. One of the basic courses at St. Paul's, this is designed to help the trainee to understand his blindness better, its meaning, its effects on skills and attitudes. Its purpose is to assist him to know and to face the problems involved, and then to give him the information as to what he can do about it. This is principally a lecture course, involving some participation and discussion.

Group Psychotherapy. The trainees meet twice a week for an hour each time. The purpose of the meeting is to provide an opportunity for expression of real feelings, attitudes and opinions in a permissive setting, where the role of group leader is to clarify the meaning of the particular situations that arise.

Group Vocational Counseling. The purpose of these sessions was to promote a close, cooperative relationship between counselor and his client. It was also intended to develop, on the part of the trainee, an understanding of some of the problems attendant upon employment as a blind person. An effort was made to develop an awareness of the factors which promote - as well as those which deter - the development and maintenance of a satisfactory employment situation.

Self Appraisal. The course is designed to acquaint the trainee with the usual drives and feelings which may be expected as a reaction to life. The usual methods of expression and control are considered through group participation.

Techniques of Daily Living (T.D.L.) - Principles. This is one part of a twofold course which is concerned with handling the hundreds of small (by themselves) problems which arise in the course of the everyday life of a blind person. This section deals with the ease of meeting constantly arising situations and putting sighted people at ease. The subject matter covered is given in Appendix 2.

Legislation and Citizenship. A survey of the sociological attitudes towards blindness through the years. An analysis of present-day federal and state legislation regarding blindness, responsibilities and rights under the law.

Gripe Session. A weekly meeting of trainees and the Assistant Administrator to allow for the airing of gripes by trainees and administration. Not to be confused with group psychotherapy, these meetings deal with the surface mechanics of complaints.

3.5.2. Evaluation by Means of Ranking

Although these are lecture-type courses in most, if not all, of them the trainee is expected to join in the discussion. The

trainee's performance is not graded in any of them, although a report is written by each instructor for each trainee and his achievement is assessed as satisfactory or, in a very few instances, unsatisfactory (no assessment is made of the gripe session). The lack of grades is unfortunate as it makes comparison of the 12-week and 16-week programs almost impossible for this entire series of courses and yet these attitude courses are regarded by some members of the staff of St. Paul's as being of equal, if not greater, importance than the skill courses. The course "Attitudes and Analysis" in particular is regarded as a very important part of the St. Paul's method of rehabilitation. It is based on a book by the Director, Father Carroll,[1] and was initially taught by him, but is now taught by a member of the staff. In this course the 20 or so losses that may be incurred with the onset of blindness are enumerated and the means, or lack of means, of substituting for these losses is discussed.

It seemed essential to try in some way to assess these courses which form a large and, to some extent, controversial, part of the program. As the written reports by the individual instructors were the only records available, an attempt was made to utilize them. The reports for each trainee for each of the first five courses listed above were copied, each on a separate sheet of paper. Then the instructors were given their own reports, in batches comprising one group of trainees, and were asked to rank the trainees within each group. At a meeting of the instructors involved the criteria to be used in ranking were discussed, but a clear definition was not achieved. The aspects considered included verbal participation, both amount and quality, the trainees' initial attitudes and the amount of change in these attitudes which had been observed and was believed to indicate benefit derived from the training. The staff members involved were not very·happy with this idea which originated in Group 17. From this time onward some of them ranked the trainees of subsequent groups at the same time as they wrote the reports and others had to be coaxed to do so and were always several groups behind. As memory was involved for the 12-week groups, it was not considered wise to go farther back in the records than Group 9; this gave eight 12-week groups and eight 16-week groups for analysis.

During these 16 groups the courses "group therapy" and "self-appraisal" were taught by the same two instructors. "Group Vocational Counselling" was taught by the same instructor subsequent to Group 14, the earliest group ranked for this subject. "Attitudes and Analysis" was initially taught by both the director and the administrator, but the latter wrote the reports and did the ranking; after Group 21 teaching (and ranking) was carried out by a staff member. The course called "Principles of Techniques of Daily Living" was taught by several different instructors and it was not possible to obtain ranks for Groups 12, 18, and 19. With these three exceptions and the omission of "vocational counselling" from Groups 9 to 13, rankings were obtained for each of these five courses for all groups from 9 to 24.

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[1] Carroll, T. J.: "Blindness: What It is, What It does, and How to Live with It". Little, Brown and Co., September, 1961.

In Table 3.3 the value of W, the coefficient of concordance, is given. This coefficient, which can range between 0 and 1, measures the agreement between the instructors in the rank assigned to each trainee of a group. The extent to which the instructors agreed on Groups 22 and 23 was not significant, but for all the other groups, although low, it was significant at the 5% level and for nine of the 16 groups it was significant at the 1% level. There was no apparent difference in the amount of agreement between instructors when 12-week and 16-week groups were compared in general and the reason for the disagreement on Groups 22 and 23 is not known.

The extent of the overall agreement seemed to indicate that the average rank gained by a trainee might be used as an indication of his performance in the attitude courses. It was then decided to compare attitude rank and skill rank to see whether the two were related, and, if so, whether there was any difference in the extent to which they were related in the 12-week compared with the 16-week groups. The weighted and adjusted final skill grade was used to obtain the skill rank of each trainee within his group. The skill ranks and attitude ranks were then compared and the values of r_s, the correlation coefficient, are shown in Table 3.3, together with their significance. It is surprising to observe that only in Group 19 is the correlation significant at the 1% level and in half the groups it is not even significant at the 5% level; in fact, in Group 18 the tendency is towards an inverse relationship! The amount of agreement between attitude and skill rank is not related to the amount of agreement between the attitude instructors; in other words, there is no apparent relationship between r_s and W, and in view of this, it did not seem to be profitable to investigate whether there was closer agreement between skill and attitude ranks of an individual instructor. There is no difference between the 12-week and 16-week groups in the extent to which skill and attitude ranks are related.

3.5.3. Need for Measurements

This lack of relationship between skills and attitudes does not seem to be in accordance with the beliefs of the instructors at St. Paul's. It does seem to point up the need for better measurements of the two variables. It does not seem to be unreasonable to ask the psycho-social department to rate the trainees early in the program on such specific aspects as motivation, anxiety, confidence, etc., so that the importance of these to the learning ability of the trainee could be assessed in relation to his subsequent performance in the skill courses.

An attempt was made to administer the Taylor Anxiety Scale to one group of trainees at the 7th week and again at the 16th. The test did seem to divide the trainees into two groups and there was some indication that the most anxious group showed less anxiety on the second occasion. Of course, the numbers involved were too small for any conclusions to be drawn regarding the relationship

with learning ability, particularly in view of Matarazzo's* conclusions, but it did seem to be a worthwhile approach.

The administration of psychological tests seemed to be outside the scope of the biostatistician engaged on this study and the staff psychologist at St. Paul's was not sufficiently motivated to pursue the matter further. During the grant period there were several changes of social worker. Thus although very good social history information was tabulated for a few groups of trainees, this was not maintained and the records were inadequate to enable any comparisons to be made between performance in the program and such social background information as living arrangements, income, education, past employment, etc. although the staff have many times asserted that the trainees who coped with blindness most successfully were those who had coped with problems in sighted life most successfully. This observation is of course in accordance with the findings of others who have investigated the psychological reactions to other crises.

It must be concluded that no means were available to assess the benefits derived by the trainee from the attitude courses while he was still at St. Paul's. Nor was there adequate information to assess how far his previous background and experiences influenced his attitude towards blindness. Some small attempt was made to cover changes in attitude in the questionnaire administered to past graduates (see Section 5.2), but apart from this it proved impossible to evaluate 12 compared with 16 weeks of psychosocial training.

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*Matarazzo, R. G.: J. Consult. Psych., 19, 3, 1955, p. 218; ibid. 20, 1, 1956, p. 70.

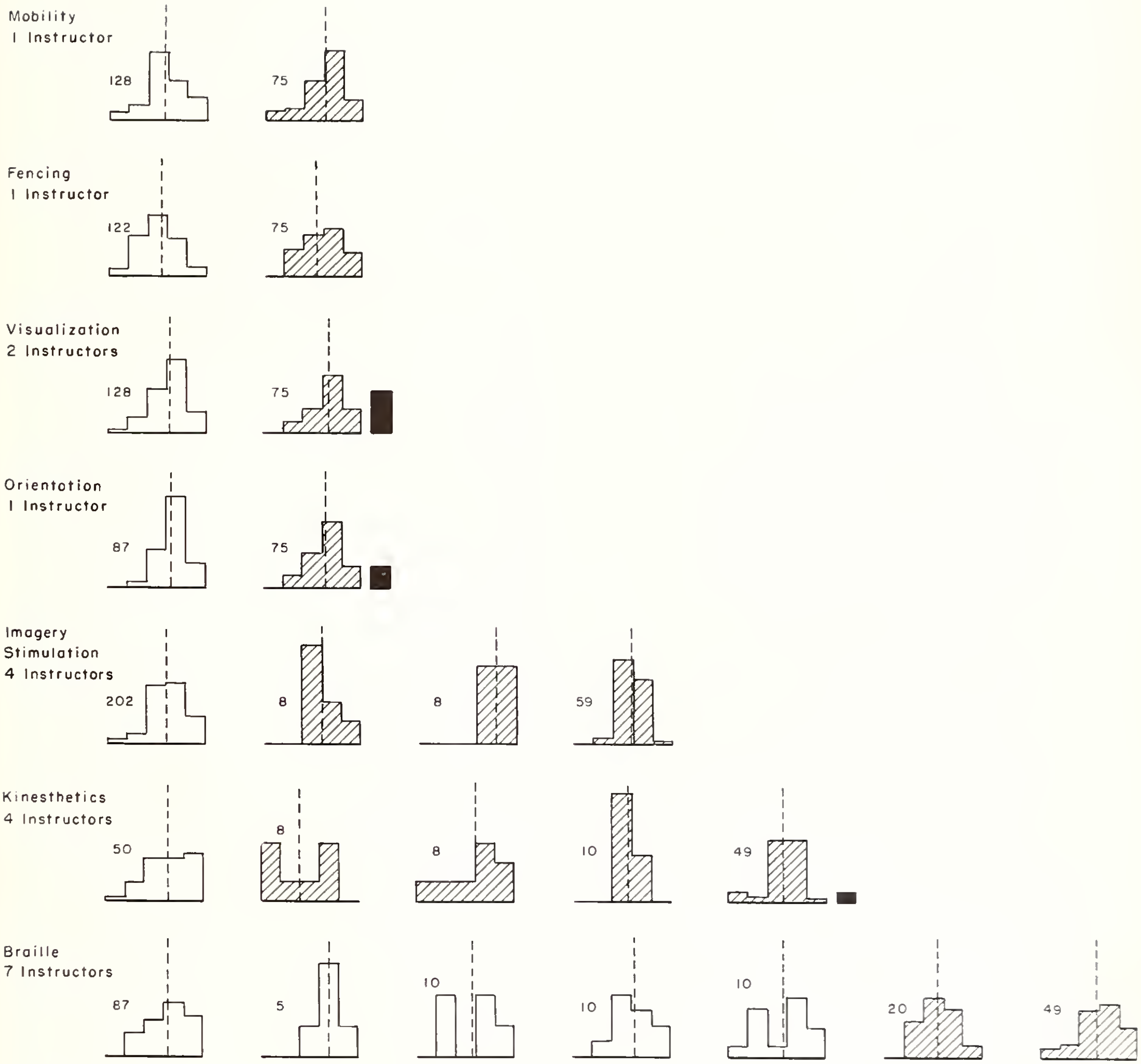

Fig. 3.1. (Continued next page)

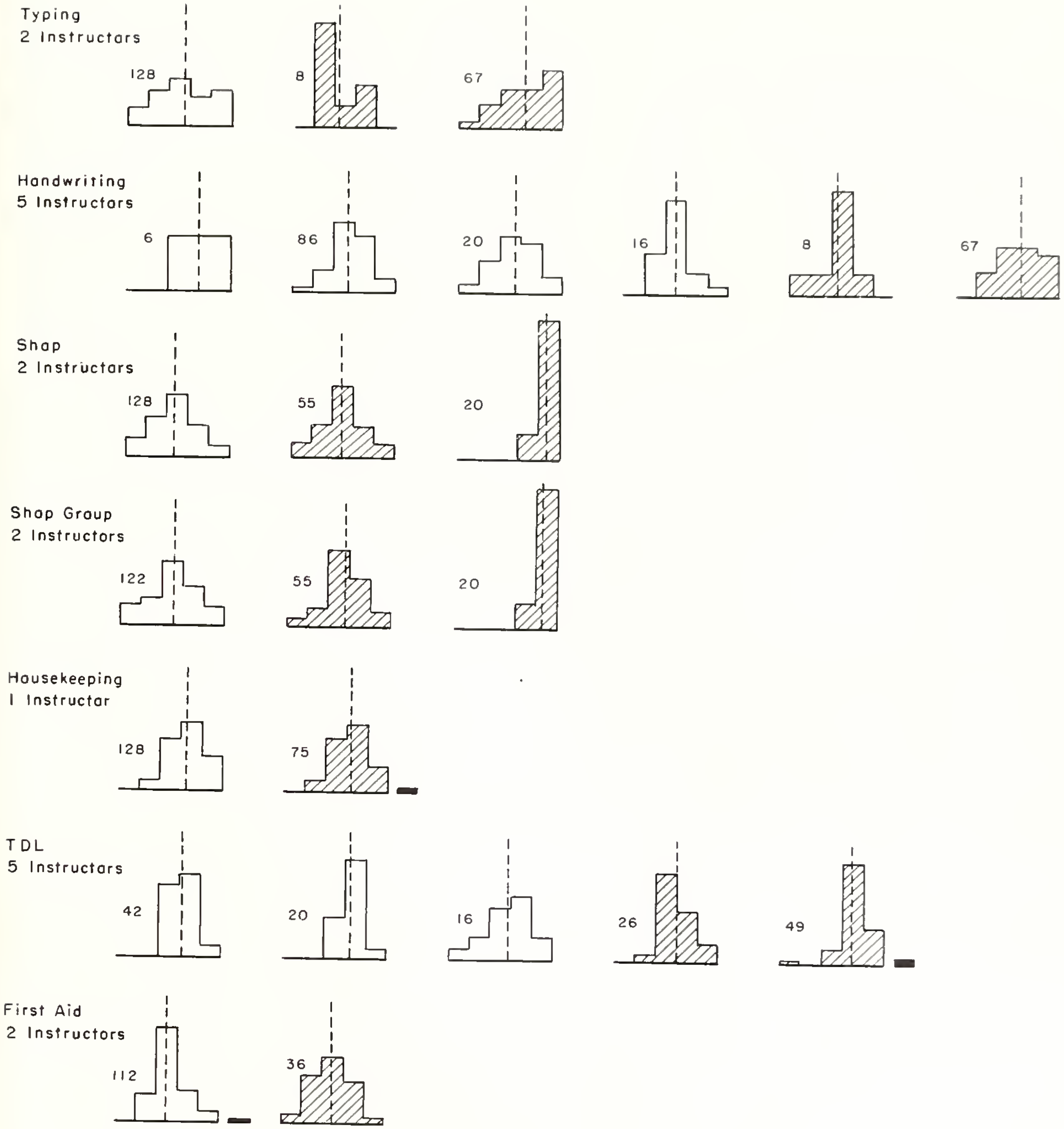

Fig. 3.1. Percentage Histograms of Final Grades Given by Individual Instructors in Each Skill Subject for the 12-Week and the 16-Week Course (shaded). All base lines cover the grade-range 0-4 and vertical lines indicate the average grade awarded by the particular instructor. The numbers on the left of each histogram indicate the total number of trainees taught by each instructor. Ungraded trainees shown at right-hand side of histogram (black).

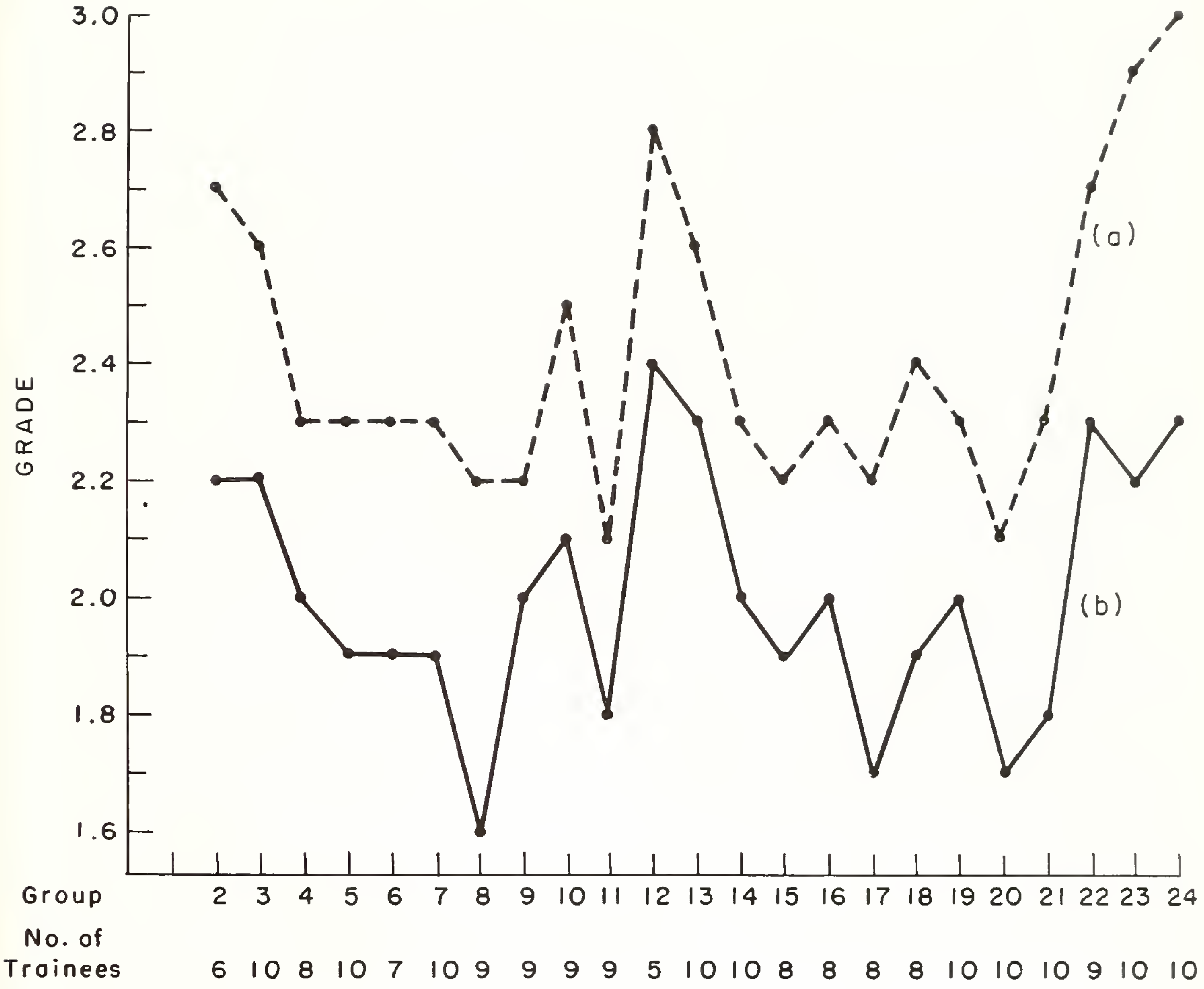

Fig. 3.2. Comparison of Raw Average Grades (a) with Adjusted Weighted Grades (b) for Each Group of Trainees

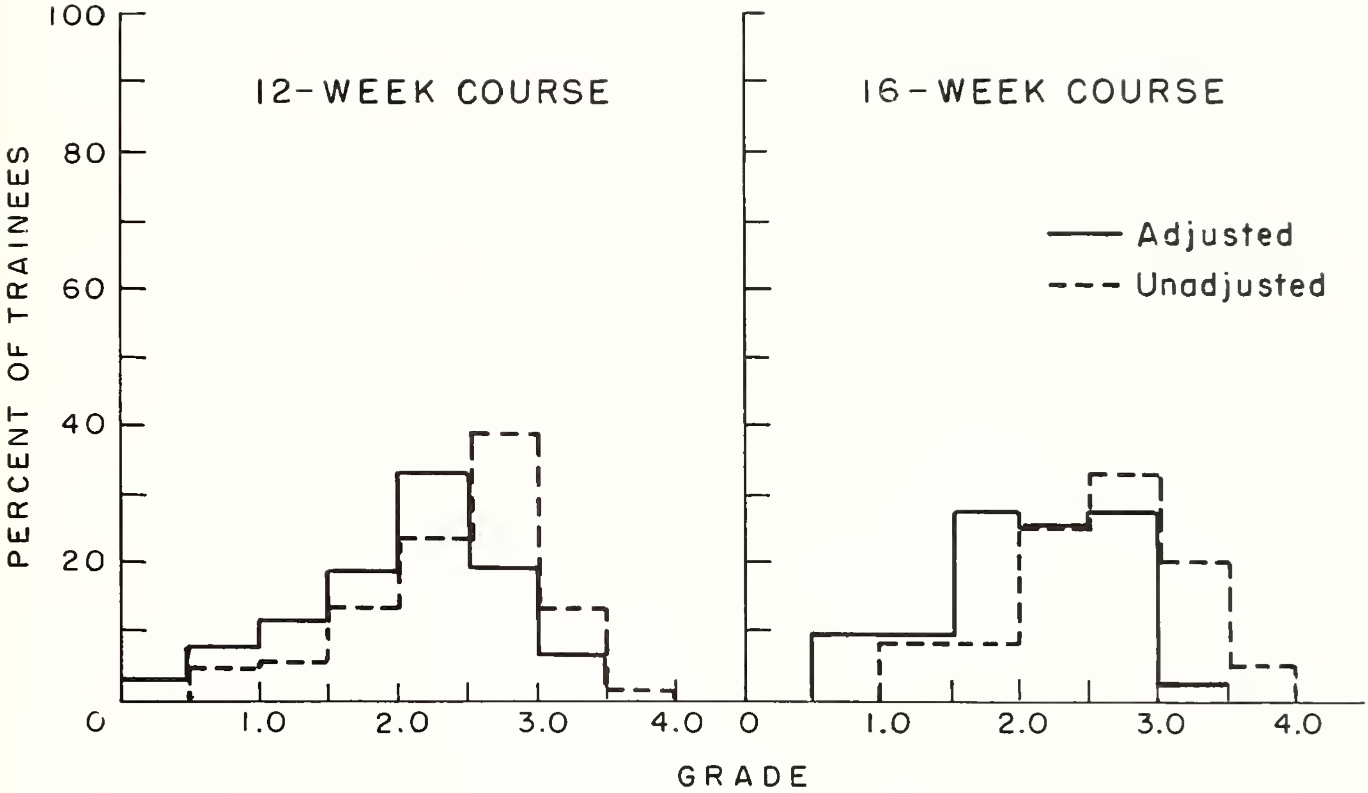

Fig. 3.3. Comparison of Distribution of Final Grades Obtained by All Completing either the 12 or the 16-Week Course

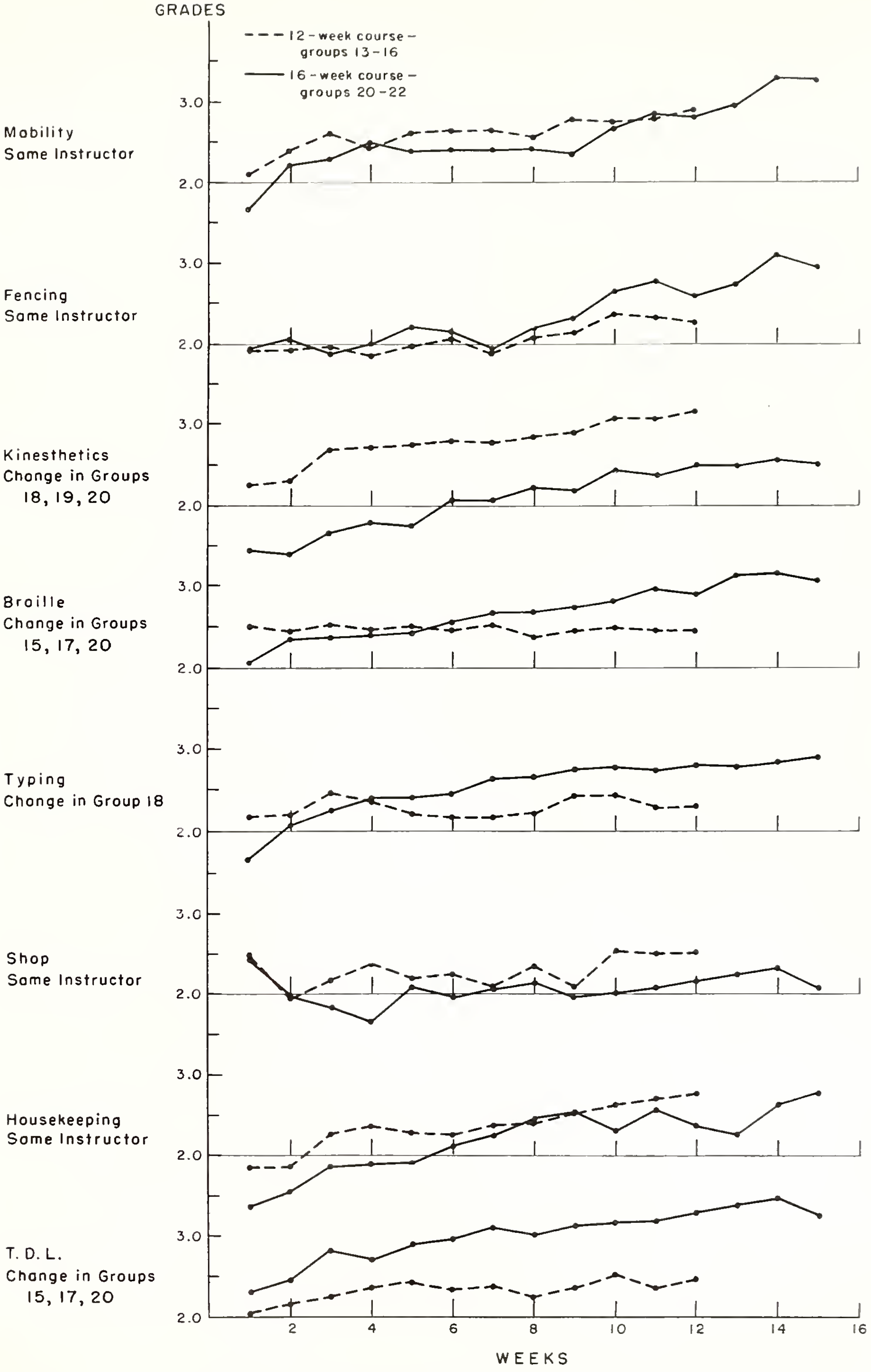

Fig. 3.4. Weekly Grades Averaged over a Year for Selected Subjects. No correction made for change in instructor.

Table 3.1. Changes of Instructors by Group (Skill Courses)

Subject	Group Course Started+	Groups When Instructor Changed
Mobility	2	
Fencing	3	
Visualization	2	
Orientation	7	
Sensory Training	18	19
Imagery Stimulation	5	17, 18, 19
Kinesthetics	6 (11)	18, 19, 20
Braille	2	3,* 12, 13, 15, 17, 20
Typing	2	18
Handwriting	2	3, 4,* 12,* 13, 15, 18
Shop	2	23
Shop Group	2 (3)	23
Housekeeping	2	
TDL - Drills	2	3,* 7,* 13, 15, 17, 20
Spoken Communication	19	
Personal Hygiene omitted in Group 3, not graded in Group 21 & subsequently	2	4, 17

+Brackets indicate when grading was introduced.
*Some doubt about these changes, so they have not been included in the histograms.

Table 3.2. Skill Courses - Number of Periods per Week Spent by an Individual Trainee in Each Subject

Groups	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mobility	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5
Fencing	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Visualization	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	(3)	(3)	3	3	3
Orientation	0	0	0	0	0	(1)	1	1	1	1	1	1	1	1	1	1	1	1	(1)	1	1	1	1
Sensory Training	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2
Imagery Stimulation	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Kinesthetics	0	0	0	0	B	B	B	B	B	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Braille	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Typing	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Handwriting	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Shop	6	6	6	6	6	6	5	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5
Shop Group	(1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Housekeeping[A]	5	5	5	5	5	4	5	4	4	4	4	4	4	4	4	4	4	4	4	6-4	6-4	6-4	6-4
TDL-Drills	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1
Spoken Communication	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2
Personal Hygiene	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	C	C	C	C
Total Periods	33	36	37	38	38	38	38	38	38	40	40	39	39	39	39	38	39	40	40				

Brackets indicate grades not available.

[A] Housekeeping: From Group 22 onwards the men had 4 hours a week and the women 6 hours.

[B] Course given but not graded; went by name of "Sensory Training".

[C] Course given but not graded.

Table 3.3. Values of W, Showing the Agreement Obtained by Instructors in Five Attitude Courses When Ranking Members of a Group of Trainees; also, Values of r_s, Showing the Amount of Correlation between Average Attitude Rank and Skill-Grade Rank

			W		r_s	
Group	No. of Trainees	Attitude Courses Not Included	Value	Significance	Value	Significance
9	9	Voc. Counsel.	0.557	*	0.697	*
10	9	" "	0.704	**	0.550	n.s.[1]
11	9	" "	0.805	**	0.644	*
12	5	Voc. Counsel. & T.D.L.	0.891	*	0.633	n.s.
13	10	Voc. Counsel.	0.591	*	0.055	n.s.
14	10	-	0.425	*	0.614	*
15	8	-	0.739	**	0.667	*
16	8	-	0.647	**	0.190	n.s.
17	8		0.455	*	0.515	n.s.
18	8	T.D.L.	0.836	**	-0.287	n.s.
19	10	"	0.802	**	0.782	**
20	10		0.572	**	0.729	*
21	10		0.601	**	0.248	n.s.
22	9		0.300	n.s.	0.025	n.s.
23	10		0.348	n.s.	0.608	*
24	10		0.505	**	0.558	*

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[1] n.s. = not significant.
*Significant at 5% level.
**Significant at 1% level.

4. SENSORY TESTS

During all classes at St. Paul's trainees with some remaining vision are required to wear occluders. One of the main purposes of this requirement is to encourage them to rely on their other senses rather than on whatever vision they may have which is in general so little that it tends to be a hindrance rather than a help in many situations. Thus, not only in the course called "Sensory Training" but in all the skill aspects of the program, stress is placed on utilizing the remaining senses to their best advantage. This whole matter of sensory development is rather controversial. Apart from those who erroneously believe that blindness is automatically accompanied by an enhancement of the remaining senses, there are those who believe that the senses can be improved and those who believe that this is impossible. In an attempt to discover good tests of taste and smell a visit was made to the Arthur D. Little Laboratories where a program is conducted to train persons to become professional tasters or smellers in industry. Tests are administered to prospective students to cull out those with the best natural ability and these persons are then subjected to a course in analyzing tastes or smells akin to those with which they will be subsequently associated. Unfortunately the tests are not repeated at the end of training so no objective criterion of the efficacy of the program is available, although presumably industry would not pay large sums for a training for personnel that was not effective. On the other side of the argument may be found psychologists who affirm that the senses are at their greatest acuity in childhood and thereafter decline with age.

Part of the difficulty seems to be that the word "senses" is not well defined. It is not clear whether the references are made to the traditional five senses or whether they include such senses as the kinesthetic sense, the vestibular sense, etc. Even when a specific sense such as the sense of touch is mentioned there is room for much confusion. One of the instructors at St. Paul's distinguishes three different functions of this sense.* It is, of course, difficult to isolate the functioning of individual senses as even simple actions commonly rely on information conveyed by a variety of sensory receptors, although the sighted person is most aware of the information conveyed by the eyes and uses sight to "censor" information conveyed by the other senses. In this section a series of tests are described that were designed in an attempt to isolate senses of importance to the trainee. They are all physical senses, and do not cover such attributes as the sense of humor, with the exception of one which attempts to measure the sense of rhythm. They were administered to the trainees in the second, eleventh and fifteenth weeks of training. (The eleventh and fifteenth weeks were chosen as it was difficult to schedule the testing in the sixteenth.) It was hoped that a beginning might be made (a) in defining those senses, if any, which showed improved performance under controlled conditions, and (b) if improvement were

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*Amendola, R.: "T.K.G. (touch, kinesthesis and grasp): The Haptic Perception of Form". Amer. Found. for the Blind (In press).

found, in determining whether this occurred only at the beginning of the program or was continued after the eleventh week. Of course to test trainees undergoing a 16-week course at the eleventh week is not equivalent to testing trainees undergoing a 12-week course at this period, but it was thought that the changed pace of the training would not have so much effect as to invalidate such a comparison as the trainees wore occluders for about the same amount of time with either length of program.

4.1. Development of Tests

Initially much time was spent reviewing the literature for suitable tests, but this proved unsuccessful as they were either not existent or required considerable modification for blind persons. It was therefore decided to try to develop suitable tests and this was done with varying degrees of success. The most time-consuming aspect of this was to make the tests of a suitable degree of difficulty. It was hoped that each test would be sufficiently sensitive to distinguish between trainees, sufficiently difficult on first administration to allow of any improvement on second and third trials to be determined and yet not so difficult that it was frustrating to the trainees. In consequence many adjustments were made to each test and only one year's results are thus available for analysis. Some tests, such as bouncing and catching a tennis ball, were abandoned early as results were not reproducible. In other areas where tests would obviously be desirable none were developed; these include tests of taste, smell, lightness of touch, tactual recognition of objects, memory and ability to visualize. An attempt to develop a test of recognition of sounds was abandoned because (a) it was suspected that trainees were discussing the results among themselves and (b) as the sound equipment available did not give a very faithful reproduction, it was necessary to recreate each sound for each trainee and this was very time-consuming.

The 12 tests finally used can be divided into three broad areas:

A. Hearing - Tests 1 and 2, sound localization.
B. Physical Fitness - Test 3, pulse recovery after exercise
C. Kinesthesis, touch and other senses:
    Test 4, revolving chair
    Test 5, locating target with pointer
    Test 6, weight discrimination
    Test 7, sandpaper discrimination
    Test 8, fabric matching
    Test 9, rhythm
    Test 10, reaction
    Test 11, walking and drawing pattern
    Test 12, length discrimination

The results of these are summarized individually below and details of the apparatus and method of administration of each are given in Appendix 3. All tests were given in the same basement area which was draped on all sides to render it relatively uniform acoustically.

One trainee at a time was taken to the testing room and given the tests, usually half at one time and the remainder at a later date as the administration of all 12 took about an hour and in order to fit in with the timetable it was not possible to take a trainee for testing for more than 40 minutes at a time. The limitations of the timetable were such that it was sometimes necessary to schedule evening periods in order to test all trainees within the week. All tests were administered and recorded by the same two research workers together and an effort was made to render the testing conditions as uniform as possible on each occasion.

It was not possible to obtain a matched control group so that the performance of the trainees could be compared with those of blindfolded sighted adults, but those tests which were portable were taken to the Harvard School of Public Health and administered once to a group of faculty members and students. The conditions of administration were different, more than one test being conducted in the same room at the same time and the method of selection of persons was arbitrary. Nevertheless, the results of the Harvard group are also quoted below as they do indicate that there was no obvious difference between the average performance of the trainees, and the average performance of sighted adults wearing blindfolds. The Harvard group consisted of eight males and three females, average age 43, which is similar to that of the trainees, but other differences of education and motivation, etc. were so great that it was considered that significance tests of differences would be misleading rather than helpful.

4.2. Results of Tests

In the following tests only those trainees are included who took the particular test at all three periods; the number included varies from test to test as some trainees had physical handicaps that prevented them from performing some tests. For convenience the following notation has been adopted throughout:

Period a = second week of training
Period b = eleventh week of training
Period c = fifteenth week of training

Where a test consisted of more than one attempt on each occasion, these attempts are referred to as trials. The term group refers to the trainees who took their training at the same time. The 5% level of significance is indicated by a single asterisk, the 1% level by a double asterisk and the abbreviation n.s. is used when a derived value is not significant at the 5% level. Where analysis of variance techniques have been used, only the mean square (M.S.) and degrees of freedom (D.F.) have been given for each source of variation.

Test 1 - Sound Localization (cricket)

This first test was designed to determine the trainee's ability to define the direction from which a sound came. The sound in this case was the click of a metal "cricket" which was directed in random order from eight equidistant points on a 12-foot circle around his chair. The error in his indication of direction was recorded to the nearest 45° angle.

It is a well-known phenomenon that even persons with good hearing sometimes mistake a sound that is directly in front of them as coming from directly behind, and vice versa. This occurred quite frequently during this test and so the data for positions 1 and 5, immediately in front and immediately behind, were treated separately from the data for other positions. Consequently the analysis was based on the six remaining positions. Two trials were given at each position at each period so that any immediate learning effect on the test could be separated from a long-term learning effect between periods. Examination of the averages for three groups showed that of the nine group-periods in only five instances is the average for the second trial greater than that for the first. Thus the possibility of immediate learning effect was discounted. The two trials were therefore added together and the score over the six positions for each trainee for each period was used to determine differences between trainees, periods and groups. The analysis of variance was as follows:

	D.F.	M.S.	Significance
Periods	2	22.98	*
Groups	2	34.39	**
Trainees within groups	23	26.96	**
Period-group interaction	4	2.52	
Remainder	46	5.46	

The average performance for each of the groups was as follows:

	No. of Trainees	Period a	Period b	Period c
Group 21	9	5.2	3.1	3.2
22	7	3.4	1.9	1.1
23	10	5.0	4.8	3.6
All groups	26	4.7	3.4	2.8

Thus, an improvement with time occurred within each group except 21 where the score for period c was slightly higher than for period b. The overall difference between periods a and b approaches significance at the 5% level, the smaller difference between b and c does not, but if consideration is given to the time intervals involved, the difference per week is the same in each case.

The conditions for each group of trainees each period were the same except that Group 21 was seated facing position 1, whereas Groups 22 and 23 were seated facing position 5. To investigate how much differences between positions were due to natural phenomena and how much were due to peculiarities of the room the group scores were used. For this purpose the groups were regarded as separate entities and attention was not paid to the different numbers of trainees in each group. The following analysis was obtained:

	D.F.	M.S.	Significance
Positions	5	27.00	*
Direction	1	13.44	n.s.
Groups	2	149.09	**
Interactions			
Position-direction	5	216.58	**
Group-direction	2	1.20	n.s.
Group-position	10	11.30	n.s.
Remainder	20	9.26	

This shows differences between the positions on the circle from which the sound originated but not in the direction of error. The group-direction and group-position interactions are also small indicating that the reversal of sitting position did not have a marked effect; in other words, the room itself was reasonably uniform. The high position-direction interaction corresponds with the findings of Jongkees and v.d. Veer* who describe an S-shaped curve when deviations are plotted against true direction. In other words, there is a tendency for persons with normal hearing to locate a sound at a more acute angle from their nearer ear than it really is. This was found to still be true when their subjects used the further arm rather than the nearer arm to point to the sound, and again still true when they were not able to see the sound source.

In this connection it may be noted that with newly-blinded adults the kinesthetic sense does not seem to be as poor as has been reported with some congenitally blind children and it was not felt that errors of direction were made because the trainee did not know the direction in which his arm was pointing. This point was further verified by the small directional errors encountered on the pointer-target test. For this reason it was not considered necessary to use an elaborate nose-pointing apparatus as is used at the Industrial Home for the Blind, N.Y.

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*Jongkees, L.B.W. and v.d. Veer: "Further Investigations into Peculiarity of Normal Directional Hearing", Acta Oto-Laryngologica, Vol. 49, January-December, 1958, p. 47.

The average direction of error for the eight positions is as follows. Each value is derived from two trials at three periods for 26 trainees, i.e., 156 attempts.

Segment	Average deviation in degrees clockwise
1	-3.46
2	11.25
3	0.87
4	-13.85
5	-3.46
6	9.81
7	-3.46
8	-10.96
Total	-1.66

All the foregoing analysis has excluded positions 1 and 5 where reversals occurred. The following shows the relationship between number of reversals obtained in all three periods by an individual and the average number of errors in other positions and the average score obtained.

No. of reversals	No. of persons	Average no. of errors	Average score
0	13	0.85	7.23
1	7	1.57	7.86
2	4	2.00	16.75
3	2	3.00	33.50
Total	26	1.38	10.88

These are highly correlated, the correlation coefficient between score and reversals being $r = 0.717$. In view of this high correlation it may be questioned why these two positions were excluded from the score. They were excluded because it seemed to be giving too much emphasis to a reversal to count it as an 180° error, but the close correlation indicates that this exclusion probably made little difference to the final conclusions.

Although the type of errors encountered are similar to those found by Jongkees and v.d. Veer to occur with persons with normal hearing most of the trainees being tested had some hearing loss. To see how far hearing acuity affected the localization score the average score was computed for each hearing category. (The categories were those obtained from analysis of the audiograms.)

The lowest score was obtained by those with no hearing loss, category A, and the highest by those with severe loss, but analysis of variance shows no significant difference between the groups. This rather surprising result agrees with the findings of the teaching staff that those who had a hearing loss had frequently learned to use the hearing ability that they had very effectively. It is more disappointing from the point of view of the value of the test

to find that there is no correlation with final mobility or orientation grades, the values of the correlation coefficients being 0.29 and -0.06 respectively.

The test described above was based on the advice of D. C. Teas of the Central Institute for the Deaf, following a request for a simple localization test. As the results show, it was adequate for distinguishing between trainees and the results obtained seemed to be comparable with those obtained under similar conditions by other investigators. Unfortunately for the purpose at hand the test gave random errors too large to determine whether further improvement occurs between the 11th and 15th week. It was thought that a possible source of error was that the trainees could hear the tester creeping around the room in sneakers and sometimes seemed to point to the tester rather than to the cricket which the tester was holding at arm's length. To eliminate this eight speakers were purchased and placed on stands at eight points on the circle. They were connected to a tape recorder. To enable a closer correlation with hearing loss different sounds were recorded and used for this localization test. Unfortunately the apparatus was not ready for use until Group 24.

Test 2. Sound Localization II (speakers)

The procedure was similar to that of the previous test, but the source of sound was one of eight speakers arranged around the circle. Three sounds were used, bursts of 1½-2 seconds of white noise, 3,000 cycles and 250 cycles. Recording was again in terms of 45° segments deviation from the true direction.

The apparatus proved disappointing; in the interests of economy a cheap switchbox had been purchased and when a switch was turned on frequently the response was a crackling sound from the speaker instead of the intended frequency. By the time the apparatus was adjusted so that the correct sound was emitted, the trainee had located the sound source. On other occasions particular switches did not produce any sound from the speaker, and this became progressively worse.

In view of this, it is not surprising that the average number of errors obtained by the eight trainees tested was lower than for the cricket. The results were not considered sufficiently reliable for detailed analysis, but there was some indication (a) that white noise was easier to locate than the two single frequencies and (b) that the predominant direction of error again followed the S-curve and (c) that there was improvement between periods. The total number of deviations (corrected for nonfunctioning of the apparatus) for eight trainees for one trial at each of six positions for each of three sound sources (i.e., 18 localizations per trainee) were as follows:

Period a	13.3
b	7.9
c	1.0
All periods	22.2

giving an overall average score per trainee of (22.2/8) x (2/3) = 1.85 when adjusted to the same basis as the cricket scores where there were two localizations per position.

It was hoped that much more information could be obtained from this detailed test and that it would be possible to determine the relationships between directional errors and hearing loss at particular frequencies. If it had been possible to obtain rates of improvement for each sound source their relative difficulties for persons with and without hearing losses could have been assessed. In addition, it was planned to determine what effect differences in height of the sound had on the ability to distinguish the direction of the sound and also to develop a test where sounds were emitted at different heights and the trainee was asked to determine the height rather than the direction. This is a necessary ability for a blind person who needs to know whether a person who is speaking is seated or standing. As hearing is one of the most important senses for the blind person and as most of the trainees have some degree of hearing loss, it seems to be of great importance to know what sort of errors can be expected with a particular type of loss so that trainees can be made aware of the extent to which they can rely on their recognition of auditory cues.

Test 3. Pulse Recovery after Exercise

Many trainees immediately prior to entering St. Paul's have been leading a very sedentary life. During their time at St. Paul's they are physically active for at least part of each day in such courses as mobility, orientation, kinesthetics and fencing. Although the prime purpose of these courses is not to increase the trainee's physical fitness, it is conceivable that this is a desirable side effect. It has also been suggested that the irregular scheduling of these classes from day to day is harmful to those trainees who are diabetic. It seemed desirable therefore to measure the trainee's physical fitness in order to determine whether it changed during the program, and whether it was related to his overall performance.

After discussion with the staff physician and with Dr. Forbes of the Harvard School of Public Health, who had been involved with the assessment of the physical fitness of soldiers during the war, it was decided that an adaptation of the "step test" used by the Fatigue Laboratory would probably give the desired information. One important modification was that instead of exercising to the point of exhaustion the trainees should only be asked to exercise sufficiently to obtain an appreciable increase in their pulse rate, and it was decided not to exceed 120 beats per minute. With this in mind a lower step was constructed and the trainees were not asked to wear a pack. Initially an attempt was made to interrupt the trainee during the exercise and read his pulse, and exercise was terminated when a rate of 120 beats per minute was reached. This was not satisfactory as it was found that two minutes' exercise with a 15 second interruption did not have the same effect as two consecutive minutes. The final procedure was to give all trainees a "trial run"

initially of one minute's exercise. Those who reached 120 in this trial were subsequently asked to do only one minute's exercise on each of the three occasions; the remainder were asked to do two minutes.

The results were analyzed by treating the one minute and two minute exercise trainees as separate groups. As the duration of exercise was thus fixed, the index used by the Fatigue Laboratory could not be utilized.[1,2] As the main objective was not to compare trainees but to determine amount of change in an individual trainee no attempt was made to define a similar index. Instead the five readings obtained

1. Resting pulse
2. After exercise 0-¼ minutes
3. After exercise 1-1½ minutes
4. After exercise 2-2½ minutes
5. After exercise 3-3½ minutes

at the three different periods were compared for each individual and ranked, one being the lowest pulse rate and 3 the highest. These ranks were then averaged for each group of trainees (the 1 minute and 2 minute exercises being treated separately). If recovery had been more rapid for the later periods, the average rank order would have been 3, 2, 1 for the resting pulse rates. This was not found to be true, and no consistent differences with time could be detected.

Another approach that was also tried was to consider not absolute rates but the time required after the cessation of exercise for the trainee's pulse to return to the resting pulse rate obtained before exercise. A graph was drawn for each trainee and the time to recovery determined. These times were then ranked but again no consistent pattern was observed.

With each group of trainees minor modifications were made in an attempt to make the test more standardized, but the erratic responses continued. Unfortunately it was only when the testing was completed that the possible importance of the time of day at which the test was administered was appreciated. Two research personnel took the test several times over a period of three days and for both of them it was found that when the test was given immediately after lunch the rise in pulse rate with exercise was greater and subsequent recovery slower. No account had been kept of the time of day at which the trainees took the test, so no correction for this could be made.

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[1] Johnson, R.E., Brouha, L. and Darling, R.C.: "A Test of Physical Fitness for Strenuous Exertion". Revue Canadienne de Biologie 1:491, June 1942.

[2] Brouha, L., Darling, R.C., Dill, D.B., Forbes, W.H., Graybiel, A., Heath, C. and Johnson, R.E.: "The Problem of Measuring Physical Fitness for Hard Work." Fatigue Lab., Morgan Hall, and Grant Study, Hygiene Dept., Harvard Univ., Report #7, OSRD Contract #54 (OEM cmr).

Although this test was inconclusive, it does seem to be a matter which is of great importance. A great many of the diabetic trainees die shortly after leaving St. Paul's, and although St. Paul's is concerned primarily with the emotional and skill aspects of rehabilitation, these are of little avail if they are at the expense of the physical well-being of the trainees. Information on the life expectancy of a long-time diabetic blinded by the disease does not seem to be readily available, but in view of the high proportion of trainees suffering from this disease it seems desirable to know whether a training program that encompasses long hours of physical and emotional stress is in fact harmful to them.

Test 4. Revolving Chair

During the training at St. Paul's considerable importance is placed on developing the trainee's kinesthetic sense, both in the course so named and in other courses. Trainees do not learn to find their way in a familiar place by counting the number of paces, but they rely on their "muscle memory"; a sighted person does not need to look at a familiar flight of steps as he goes up or down but uses this same sense. In this test an attempt was made to separate the trainee's awareness of muscle movement from his use of his directional sense by confusing the latter. He was turned in a revolving chair with his head in an upright position so that the horizontal vestibular canals were sufficiently affected to give him a false "sense of direction". He was then asked to walk in a straight line to the opposite wall and his deviation from the center was measured.

Six trials were given at each testing period (for details, see Appendix 3), the chair being turned once, twice, and three times in clockwise and counterclockwise direction. Only one out of 27 trainees needed more than two attempts to enable him to walk in a straight line before being turned in the chair. All except three deviated after being turned once in the chair, and these three also deviated after more turns, and some walked so far off course that they encountered the side walls before reaching the end of the room. There was no apparent relationship between the direction of deviation and the direction of turn. In Group 22 the speed of the chair was increased from 30 turns per minute to 45 turns, but although this had the effect of increasing the magnitude of the deviations it did not affect the apparent randomness of the direction of deviation. The direction was therefore not considered in the following analysis and the two deviations following clockwise and counterclockwise spins of similar number of turns were added, thus giving three readings for each trainee at each period, corresponding to 1, 2 or 3 turns. Group 22 was omitted as this was the first group with the increased speed and several trainees encountered the side wall; as we were unprepared for this, no record was kept of whereabouts they encountered the side wall and so it was not possible to project their path as was done with Groups 23 and 24. Deviations were measured to the nearest 9-inch linoleum square and analysis of variance of the 27 trainees in Groups 21, 23 and 24 gave the following results:

	D.F.	M.S.	Significance
Between periods	2	145	**
Between turns	2	51	**
Between groups	2	223	**
Between trainees in groups	24	130	**
Period-turn interaction	4	26.75	*
Group-period interaction	4	17.75	n.s.
Error	204	7.96	

Thus all the first-order sources of variation show highly significant differences and the period-turn interaction also seems to be of some importance. The following gives the average deviation per trainee on a single walk in inches. (Measure used for analysis was sum from two walks in 9-inch units.)

	1 turn	2 turns	3 turns	All turns
Period a	24	26	38	29
b	19	27	23	23
c	16	14	22	18
All periods	20	22	28	

From this it is apparent that the increased mean deviation with increased number of turns that occurs when all periods are considered together only holds true for the first testing period; in subsequent tests the trainees are less affected by the number of turns. It also shows the significant improvement with time, which is almost as great beween periods b and c (a 4-week interval) as between a and b (a 9-week interval). When, however, this is broken down by groups it is apparent that this was not true of all groups.

	Group 21	Group 23	Group 24	All Groups
Period a	17	32	39	29
b	15	22	31	23
c	15	16	23	18
All periods	16	23	31	

The effect of increasing the speed is also apparent by comparing Group 21 with the other two groups. It seems that the greater speed makes a more difficult test and shows the differences between periods more satisfactorily, although separate analysis of data obtained at the lower speeds showed significant differences between trainees.

Some attempt was made to see whether the test was a good reflection of the trainee's kinesthetic awareness by comparing the initial performance of several sighted adults who took the test blindfolded, and of three blind adults (one congenital and two adventitious) who travel extensively alone and are considered to be

skillful travellers. Of the blind adults one had an average deviation of nine inches and the other two did not deviate at all. Of the six sighted adults tested two hit the side walls and all deviated; the mobility instructors deviated less than the others and one of them obtained the low average of 17 inches. This selection of subjects for comparative purposes was rather a haphazard proceeding and cannot be regarded as more than a casual observation. No independent criteria were available for the efficacy of the individual's canals. Nevertheless, the differences observed between the performance of the good blind travellers and the sighted adults did indicate that this test measures an awareness that the blind person can develop and needs to develop. During the 16 weeks at St. Paul's the trainees have on the average shown improvement. Even in the 16th week, however, nine of the 27 trainees had an average score greater than 18 inches. The idea suggests itself that a revolving chair could be used to make the trainees aware of this sense more rapidly.

Test 5. Locating Target with Pointer

One of the objectives of the fencing course is to develop the trainee's "extension of touch". Locating a person with the tip of the foil is considered similar to locating objects with the tip of the cane. An exercise that sighted fencers sometimes use for training is to practice lunging at a fixed point on the wall; this idea was used to develop a test for the trainees. The trainee was given a pointer and this was placed with the distant end at the center of the target. He then moved the pointer away and attempted to hit the center of the target. He had two attempts with each hand, but as earlier diagnosis showed no difference between hands or between first and second attempts, the sum of his deviations on four attempts was used for analysis.The deviations were added regardless of direction as this again did not appear to be a significant factor. The results obtained were:

	D.F.	M.S.	Significance
Periods	2	11.00	n.s.
Groups	2	83.50	**
Trainees within groups	26	36.15	**
Group-period interaction	4	18.25	n.s.
Remainder	52	15.12	

Thus, there was no significant change in the trainee's performance at different periods of the program. The apparent improvement when three groups are considered together is not found in individual groups as the following summary in terms of average number of inches per attempt shows.

Group	No. of trainees	Period a	Period b	Period c	All periods
22	9	3.6	2.8	2.6	3.0
23	10	3.7	4.1	3.6	3.8
24	10	3.8	3.7	3.8	3.7
All groups	29	3.7	3.6	3.4	3.5

When this test was given to the Harvard group, the average deviation was 2.8 inches.

Test 6. Weight Discrimination

Trainees at St. Paul's are taught to pour liquids by lifting the cup or other receptacle in one hand and judging when it is full by the change in weight. To measure this aspect of kinesthesis, a test was devised consisting of a series of wooden blocks, all the same size but differing in weight. The trainee was asked to arrange them in order of weight and both his errors and the time he took were recorded. In the earlier groups a series of five blocks were used, but these were found to be insufficiently discriminating as many trainees could arrange them rapidly and quickly on their first attempt. A new set of seven blocks, each differing by ½ ounce, was made and these were used for the 20 trainees of Groups 23 and 24.

The trainee's "score", which consisted of the number of reversals, was first used for analysis, but although there was a difference between periods it was not significant at the 5% level. There seemed to be a tendency for those trainees who did the test most rapidly to make more mistakes, and it was also observed that some trainees who made the same number of mistakes at each period took varying lengths of time to do so. A covariance analysis was then tried to see whether differences existed when both score and time were considered. The results of the analysis of scores alone (y) and of scores corrected for time (x) are as follows:

		Score alone (y^2)		Score and time $(y-bx)^2$	
	D.F.	M.S.	Significance	M.S.	Significance
Periods	2	4.27	n.s.	3.93	n.s.
Groups	1	8.06	*	4.95	n.s.
Trainees in groups	18	1.79	n.s.	1.82	n.s.
Period-group interaction	2	1.87	n.s.	1.33	n.s.
Remainder	36	1.60		1.50	

and the average results obtained for the two groups were:

	Score	Time in secs.
Period a	2.1	84
b	2.1	58
c	1.3	79
All periods	1.8	73

The Harvard group had an average score of 2.1 and a time of 59 seconds. It must be concluded that although there is some indication that the trainees improved over time, this was not significant with the numbers available. It would perhaps have been preferable to permit a set interval of time for the test rather than allow the trainees as much time as they wished and keep account of how long they took. Perhaps smaller differences between the blocks would have made a more difficult test that would have been more discriminatory; no single trainee score was greater than 5 with these blocks, although the maximum possible (in other words, a complete inversion) was 21.

Test 7. Sandpaper Discrimination

This test was similar to the weighted blocks in that the trainees were asked to place in order five grades of sandpaper from fine to coarse. Unlike the blocks, where the actual difference between each was made equal, giving a gradation of relative differences, the sandpaper used was five commercial grades of unknown density and some were much easier to distinguish than others. Out of a total of 75 reversals, 25 were between the two finest and 48 between the two coarsest and only two between two intermediate grades. The number of reversals was small although the differences in time were great, the averages for the 38 trainees of Groups 21-24 inclusive being:

	Reversals	Time, secs.
Period a	0.68	36
b	0.82	27
c	0.47	30
All periods	0.66	31

The tendency to become quicker in period b and then finally to slow up and become more accurate was the same as for the weighted blocks. The Harvard group had an average number of 0.45 reversals and took 24 seconds.

It was decided that with the small number of reversals the best method of analysis would be to consider each trainee individually. If his number of reversals between consecutive periods increased, he was considered to have become worse; if it decreased, he was regarded as better. In those instances where the number of reversals was unchanged the time was considered, a shorter time being considered better. One trainee had the same number of reversals and took the same amount of time in two consecutive periods and he was excluded from the following figures which give the numbers of trainees exhibiting all four possible patterns of change between periods a and b, and b and c.

Between a and b	Between b and c	No. of trainees
Better	Better	11
Better	Worse	9
Worse	Better	14
Worse	Worse	3
		37

If there were no tendency to improve with time equal numbers would be expected in all four categories. The fit of the above distribution to that of the null hypothesis was therefore tested and the χ^2 value of 7.0 obtained, which could have occurred with a probability of between 0.10 and 0.05; thus, although there is an indication of improvement, it is not significant at the 5% level. It may also be observed that 25 trainees improved between periods b and c, and 20 between periods a and b, which again indicates that improvement, if real, occurred in the later part of the program as much as if not more than in the earlier part.

Test 8. Fabric Matching

This test consisted of two sets of fabrics, each set containing five pairs of fabrics which the trainees were required to match. The fabrics were of varying difficulty; a coarse piece of Harris tweed was only mismatched once in 87 trials, whereas the most difficult was a lightweight worsted which was mismatched 49 times in the same number of trials. The average number of errors per trainee for the 29 trainees of Groups 22-24 inclusive was as follows:

	Set I	Set II	Both Sets Total
Period a	1.79	2.07	3.86
b	1.59	1.83	3.41
c	1.45	2.10	3.55
Av. of all periods	1.61	2.00	3.61

The average number of errors for 10 of the Harvard group was Set I, 1.9; Set II, 1.5; and both sets, 3.4.

It was, of course, not possible for a trainee to obtain one error on a set of five fabrics as mismatching one pair would necessarily mean that at least one other pair was mismatched. Thus, for purposes of analysis the score per trainee per trial for each set was used and this was computed by adding 0.5 whenever a trainee obtained no errors, i.e., matched five sets perfectly. The analysis of variance was as follows:

	D.F.	M.S.	Significance
Periods	2	0.86	n.s.
Groups	2	3.86	n.s.
Trainees within groups	26	1.90	n.s.
Sets	1	4.35	n.s.
Remainder	142	1.28	

The first-order interactions between trainees and sets, trainees and periods, and periods and sets were not significant. Thus, although there was an apparent improvement on Set I, this was not sufficiently large to be significant. It does suggest, however, that perhaps better results would have been obtained if Set II had been less difficult; out of 87 trials there were 33 perfect attempts on Set I and only 20 on Set II.

Test 9. Rhythm

This test consisted of 12 short rhythms, each recorded twice. The trainee listened to the repeated recording of a rhythm and was asked to reproduce it. His attempt was scored on a scale of 0 to 3, 0 representing no error. The scores for all 12 rhythms were added to give the total scores used below. The average total scores per trainee were as follows:

	No. of trainees	Periods			All periods
		a	b	c	
Group 22	9	8.8	7.0	7.0	7.6
23	10	9.9	7.9	8.6	8.5
24	10	6.2	8.6	7.8	7.5
All groups	29	7.0	9.1	8.1	8.1

Analysis of these yielded the following:

	D.F.	M.S.	Significance
Periods	2	7.12	n.s.
Groups	2	12.16	n.s.
Trainees within groups	26	59.42	**
Period x Group Interaction	4	9.37	n.s.
Remainder	52	4.89	

It was noticed that the apparent lack of improvement was largely due to a very low score for Group 24 in the first period. As the method of scoring was somewhat arbitrary and there seemed to be no reason for this discrepant value, the results for Groups 22 and 23 were considered alone, as follows:

	D.F.	M.S.	Significance
Periods	2	19.58	*
Groups	1	22.00	n.s.
Trainees within groups	17	64.83	**
Remainder*	36	5.50	

*Interaction was very small so included in remainder.

It now appeared that the difference between periods was significant at the 5% level and showed improvement between periods a and b but not between b and c. Obviously, the test is open to

criticism on the grounds of arbitrary judgment of how much error. Indeed, the distribution of scores was found to be rather skew, but it did not seem to be worthwhile to transform all scores without further investigating them. Accordingly, the number of errors was counted, regardless of their magnitude and the following averages per trainee were obtained:

	Period		
	a	b	c
Group 22	5.2	4.4	4.0
23	6.9	5.2	4.6
24	4.7	4.8	4.5
All groups	5.6	4.8	4.4

Here, the improvement with time would be consistent if it were not for a low value for the first period in Group 24. As no adjustment of scores would alleviate this, no further analysis was tried. To obviate such difficulties in the future it would be necessary to record each trainee's attempt to repeat the rhythm and to have these recordings scored by more than one judge, although it is of course unlikely that a judgment of "quite correct" would have been wrongly made and consideration of numbers of errors seems to indicate that this particularly good initial performance by Group 24 was a real phenomenon.

The average score for 8 members of the Harvard group was 4.3 and average number of errors was 3.4.

The test was developed because it was observed that those trainees who performed very well in the skill courses seemed to move more rhythmically than the others. In other fields of endeavor rhythm is often used as a training aid to improve regular muscular response. It was hoped that a sufficiently reliable index of sense of rhythm could be obtained to warrant comparison with grades obtained in skill subjects, but the apparent erratic performance of Group 24 showed that the test was not as good as previously believed. It would of course be possible to do a more refined analysis on a per rhythm basis and determine whether a selected number of the 12 rhythms yielded more consistent results but the time available did not permit this.

Test 10. Reaction

Quick reaction to auditory and other cues is a desirable characteristic for the trainee who wishes to travel alone. His reaction to an auditory cue was assessed by measuring how far a yardstick fell before he seized it. The square roots of these measurements in inches were used for analysis as these would be more linearly related to time of reaction. Each trainee had five trials at each period, and the average per trainee of the sum of five trials was as follows:

	Group 21	Group 22	Group 23	Group 24	All groups
Period a	8.06	7.56	8.50	8.64	8.25
b	6.82	8.19	7.97	7.67	7.76
c	7.04	7.93	7.68	8.40	7.86
No. of trainees	5	8	10	10	33

Analysis of variance on an individual trial basis gave the following:

	D.F.	M.S.	Significance
Periods	2	0.44	n.s.
Groups	3	0.61	**
Trainees within groups	29	0.91	**
Trials	4	0.79	**
Interactions			
Period-groups	6	0.34	*
Period-trainees	58	0.21	*
Period-trials	8	0.29	n.s.
Remainder	384	0.15	

Thus, when all groups are considered together there is no significant difference between periods, but when single groups or trainees are considered there does seem to be some indication of difference. There is also a difference between trials, and when all periods are considered together there is a steady decrease between successive trials, when, however, the periods are considered separately it is apparent that the improvement between trials was most marked in the first period and not discernible in period c. In view of the high variability between trainees it was thought that the patterns of individual trainees should be examined. The scores for each period were considered and successive increase or decrease counted. (One trainee who did not change between periods b and c was not included.) These showed that between period b and c those who improved their score and those who obtained a higher score were evenly divided:

		Between Periods b and c		
		Decrease	Increase	
Between Periods a and b	Decrease	7	13	20
	Increase	9	3	12
		16	16	32

The non-significant marginal χ^2 shows that there was no significant tendency for individuals to change in the same direction in each period.

Considering the average scores, the trial by trial pattern and the relative scores of each individual trainee it must be concluded that although there is some indication of improvement between periods a and b, there is none between periods b and c. This is interesting in view of the time patterns shown on the weighted block and sandpaper square tests (Tests 6 and 7) where the trainees performed most quickly in period b.

Test 11. Walking and Drawing Pattern

To keep his visual imagery alive the trainee is asked in the courses on visualization and imagery stimulation to draw shapes and objects. The practical application of this is emphasized in the course in orientation when he is asked to walk certain shapes, both with and without intervening obstructions. It had been observed that there seemed to be a relationship between the pattern that a trainee drew and the pattern that he walked. If, for instance, when he drew a triangle he usually failed to make the starting and ending points meet, then he was liable to make the same error when asked to walk in a triangle. To see how far this held true and whether improvement in drawing would be accompanied by improvement in walking he was asked to draw and then walk a circle under standardized conditions that could be recorded.

Records were kept for nine trainees in each of three groups (22, 23 and 24). Thus with trials at three periods in the program and both clockwise and counterclockwise circles at each trial there was a total of 27 x 3 x 2 = 162 circles both drawn and walked. Initially an attempt was made to see whether the nine circles drawn in one direction and the nine circles walked in the same direction by the members of the group of trainees at one period were sufficiently similar in appearance for an observer to be able to match the drawing and walking record of an individual trainee. This proved to be impossible. The next procedure was to score as a "success" any circle that fell within defined boundaries. In the case of drawing the trainee was attempting to draw a circle of 2 2/5 inches diameter (12 squares) and he scored a success if his drawing line could be contained within concentric bands 1 3/5 inches and 3 1/5 inches (8 and 16 squares) in diameter. The corresponding measurements for the walking pattern were a desired circle of 9 feet and boundaries of 12 and 6 feet. Out of the possible 162, the number of successes was 42 for the walking and 48 for the drawing. A trainee could score 0, 1 or 2 on a given trial and the distribution of scores between periods showed little change, the distribution being as follows:

	Walking				Drawing			
	Period			All	Period			All
Score	a	b	c	Periods	a	b	c	Periods
0	14	18	12	44	15	15	15	45
1	11	8	13	32	9	8	7	24
2	2	1	2	5	3	4	5	12
Total No. of trainees	27	27	27		27	27	27	
Total score	15	10	17	42	15	16	17	48
Prob. of success				0.26				0.30

The total score for nine trainees was obtained for each group for each period, but analysis of variance showed no significant differences between groups or between periods for either drawing or walking.

Over three periods the trainee's score could fall between 0 and 6. Taking the probability of success as 0.26 the distribution of trainee's walking score was fitted to the binomial and found to fit very closely; in other words, there was no tendency for a trainee who had done well on one trial to do well on subsequent trials, which would result in more scores at each end of the range. Thus, either the test or the method of scoring does not distinguish between trainees. In view of this it is not surprising that there is no significant correlation between the trainee's walking and drawing score ($r = 0.088$). Indeed, this confirms the earlier impression gained by attempting to match circles by visual similarity. One point worthy of note is that when drawing the trainees always drew circles somewhat smaller than the model. It was thought this might be because they placed their hand on the paper to draw and the size selected was difficult to draw without moving the hand, but this was still true when they were asked to draw without touching the paper with their hand. As it was not relevant to the purpose at hand, no attempt was made to investigate whether this persisted for models of all sizes, but judgment of length was investigated in Test 12. Another point of interest was that the housekeeping instructor had observed that when trainees were mixing food in a bowl which requires a circular motion they usually developed a fixed pattern which was not quite circular and missed some of the mixture at the side of the bowl. She kept a record of the patterns of some of the trainees, but again no correlation was apparent with either the drawing or walking pattern of the trainee.

Test 12. Length Discrimination

As it had been observed that in drawing circles the trainee's estimation of size always erred in the same direction, it was thought that the ability to judge a linear dimension should be investigated. They were asked to feel the length of a strip of

linoleum and then select the strip of corresponding length from a range of seven different lengths. As the difference in length of consecutive strips was $\frac{1}{4}$ inch, analysis was based on units of $\frac{1}{4}$ inch, i.e., a score of -4 indicates that the trainee selected a strip that was one inch too short. If the direction of error is considered the overall average for the 20 trainees of Groups 23 and 24 is +0.2 units per trial. It is, however, more meaningful to consider amount of error disregarding direction. The averages (in $\frac{1}{4}$-inch units) obtained for matching each strip were:

	Strip A			Strip B			
	Group 23	Group 24	Both Groups	Group 23	Group 24	Both Groups	Both Strips
Period a	1.1	0.9	1.00	1.2	0.7	0.95	1.95
b	1.4	0.7	1.05	1.0	1.1	1.05	2.10
c	1.6	1.0	1.30	0.9	1.0	0.95	2.25
No. of trainees	10	10	20	10	10	20	

The analysis of variance showed:

	D.F.	M.S.	Significance
Periods	2	3.95	n.s.
Trainees	19	36.53	n.s.
Trainee-period interaction	38	71.72	
Remainder	60	151.00	

Thus, the apparent trend towards making greater errors at later periods with strip A may be regarded as a chance occurrence. If the magnitude of error is ignored and only the number of zeros, i.e., correct selections, are considered the same conclusion of no real differences between periods must be drawn.

	Strip A	Strip B
Period a	7	7
b	6	6
c	6	9
Maximum possible	20	20

This test must therefore be regarded as of little value for purposes of showing any change with time. Nor did initial inspection of the results show any marked tendency for trainees on the average to choose either strips that were too large or strips that were too small.

4.3. Summary of Results

These tests can only be regarded as tentative attempts to quantify various functions of the remaining senses. Obviously much more needs to be done, both in regard to establishing the level of difficulty of the tests themselves and in developing methods of scoring and analyzing the results. The numbers of trainees to whom the tests were administered were small and to some extent this may account for the lack of significant results; where significant differences were found between periods they showed continued improvement with time. The results may be summarized by considering the average scores obtained in each period, and whether for each successive period the score indicated better or worse performance. The test of physical fitness (No. 3) is omitted from this summary as average values were not obtained.

Test	Groups	No. of Trainees	Averages for periods compared		Significance
			b with a	c with b	
1. Sound localization I (cricket)	21,22,23	26	Better	Better	*
2. Sound localization II (speakers)	24	8	Better	Better	No test
4. Revolving chair	21,23,24	27	Better	Better	**
5. Locating target	22,23,24	29	Better	Better	n.s.
6. Weights	23,24	20	Score Equal	Better	n.s.
			Time Better	Worse	
7. Sandpaper	21,22,23,24	38	Score Worse	Better	n.s.
			Time Better	Worse	
8. Fabrics	22,23,24	29	Better	Worse	n.s.
9. Rhythm	22,23,24	29	Score Worse	Better	n.s.
			Errors Better	Better	No test
10. Reaction	21,22,23,24	33	Better	Worse?	n.s.
11. Walking circle	22,23,24	27	Better	Worse	n.s.
Drawing circle	22,23,24	27	Worse	Worse	n.s.
12. Length	23,24	20	Worse	Worse	n.s.

The sound-localization test seems to be worth developing further. The revolving-chair results would seem to justify concentrated training on development of this ability - for training purposes any revolving chair could be used as it would not be necessary to standardize the speed of revolution. The improvement in locating a target with a pointer did not appear to be significant when analyzed on a total-score basis, but perhaps more detailed analysis on a per-trial basis would be more revealing; the test certainly shows very marked differences between individual trainees.

The weighted blocks and sandpaper squares showed contradictory results according to whether number of reversals or time were considered; it would probably be more satisfactory to allow a set period of time for each test, although of course this was not possible until the average time for completion was known.

Both these measurements of time follow the same pattern as the reaction test, and it would be interesting to know how far this agreement between the patterns shown in different tests were true of individual trainees. The most puzzling feature of the reaction test is the consistent improvement on successive trials which was apparent in the first period but not in the last. When the test was first administered 10 instead of 5 trials were given and it was observed that if the trainee was told after the ninth trial that the next would be the last, his time on the tenth trial was usually much slower. It may be that by the third period the trainee remembered that he would be allowed five trials and this affected his performance. Further analysis might show that the best reading obtained in each period was a better indicator than the average of five readings.

The rhythm test does seem to show some improvement when the number of errors is considered, but the method of scoring does not seem to be adequate. Perhaps more detailed analysis on a per-rhythm basis would indicate which rhythms were of value.

The walking and drawing patterns not only showed no improvement but did not confirm the relationship between the two observed by the instructors. Further tests involving patterns of varying shapes and sizes would be necessary before the relationship could be definitely established or disproved. The choosing of strips of varying length proved to be a difficult test, fewer than half the trainees obtaining the correct strip at any period. Probably a test where the differences between strips was greater would yield better results; it would also be desirable to have a larger choice of strips in order to avoid skew distributions of errors when the strip to be selected is towards one end of the range.

Although the evidence given by these tests cannot be regarded as of great value when considering the difference between 12 and 16 weeks' training, some of the results seem to justify further development. When internal consistency has been achieved on a series of tests, it would then be possible to investigate relationships between tests and between the trainee's physical characteristics and performance in skill courses with the ultimate aim of establishing which, if any, senses can be trained and which are of greatest importance to the trainee.

5. Follow-up

5.1. Selection of Method

Ultimately the value of any rehabilitation program must be judged by the lasting effect it has on trainees after they have left the training center. It is not, however, sufficient to interview the past graduates and assess their current status; what is really needed is an assessment of the difference between their current status and their status before training. This requirement to some extent rules out an approach such as that used by the Veterans Administration* in which the blind person is asked to agree or disagree with a series of statements and his responses are used to assess his level of adjustment. It is obviously of doubtful value to ask a trainee for his response and then ask him what his response would have been before training, although it is of course possible to do this with factual rather than emotional questions. For this reason it was initially decided not to interview the past trainees themselves but to interview the person who referred the trainee to St. Paul's. In most instances this was a vocational counselor of a State Division for the blind. Such a person, it was thought, would see the trainee both before and after training and be able to give an objective evaluation of emotional changes as well as assess the trainee's acquisition of skills and the use to which he puts these skills.

A questionnaire for this purpose was designed. As it was appreciated that the counselors had different backgrounds, different concepts of rehabilitation and different amounts of contact with their clients, additional questions to enable these variables to be assessed were included. The questionnaire was pretested by visiting a State Division for the blind which had not made any referrals to St. Paul's and asking each counselor to choose a client who had been to another rehabilitation center and to answer the questions as they applied to this client. In retrospect it is obvious that this was not a very good pretest; it served to point up ambiguities or difficulties of wording in the questionnaire but, as the counselors chose clients whom they knew well, it did not give any indication of the ability in general of busy counselors to answer detailed questions about a particular client.

After minor corrections the questionnaires were printed. The addresses of trainees were obtained and written on the questionnaires which were then sorted by State and particular counselors within the state. Until this point in the proceedings it had not been fully appreciated that some counselors had referred more than 30 trainees to St. Paul's. Interviewing was begun and the following counselors were interviewed:

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*Knudson, A.B.C., Canning, R. and Bledsoe, W.: "War-blinded Veterans in a Post-war Setting." Veterans Administration, 1958.

State	No. Counselors	No. Interviews
Connecticut	2	6
Maine	4	7
Massachusetts	5	12
Missouri	3	5
New Hampshire	1	7
Rhode Island	2	5
Vermont	1	4
	18	46

By this time it was apparent that this method was not obtaining the information required. In some agencies there had been a considerable number of changes in the counselors. This meant that it was difficult to trace counselors who had seen trainees in the earlier groups - a gap of five years or more. In many instances the trainee was seen by a different counselor after training from the one he saw before training, so the desired comparisons were impossible. In some instances the counselors had only seen the trainees briefly on a few occasions. When this fact was taken in conjunction with their huge caseloads the reliability of some of their responses became suspect. Few of them would admit that they did not know the answer to a particular question, but the observation of factual errors in their responses to questions such as "Does the trainee use a guide dog?" threw doubt on the responses to questions which were less easily verified. They were all extremely anxious to be helpful, but it was observed that on repetition of the questionnaire there was a tendency for a counselor to give the same responses for different trainees. This effect would probably be enlarged with repetition; the greatest number of times the questionnaire was repeated was seven times for one counselor, but had the interviewing continued some would have been called upon many more times.

In view of these defects it was decided that this approach was unsatisfactory. Consideration was given to interviewing a relative or friend of each trainee, but this idea was abandoned as not only would it have been difficult to have obtained people whose relationships to the trainee were comparable, but it was thought that such persons would probably not be familiar with many other blind adults and so not in fact able to assess their blind relative's performance by comparison with others.

Thus the only possibility seemed to be to interview the trainees themselves. This had disadvantages; assessment of changes in attitude following rehabilitation would be difficult and the spontaneity of the responses might be suspect as trainees who had been through the St. Paul's program would know what answer was expected of them. This latter objection proved to be unfounded; the trainees were questioned by an interviewer who had had no previous association with St. Paul's and the responses he obtained seemed to be extremely frank. The questionnaire used is given in Appendix 4 and the development of pretesting and final results are discussed below.

5.2. Trainee Questionnaire

5.2.1. Development of Questions

The questionnaire was designed to cover six main areas:

(1) Trainee's opinions of the benefits of the program to him and of whether more or less of each particular course would have been desirable.

(2) a. For those employed: Employment history after rehabilitation and trainee's satisfaction with his present employment. Income compared with before blindness and before St. Paul's.

b. For those not employed: How the trainee spent his time and whether he wanted employment.

(3) Application of skills learned at St. Paul's. The questions were mainly devoted to trying to assess how far the trainee put into practice skills learned in the following areas:

a. Housekeeping
b. Shop
c. Mobility
d. Communication skills (i.e., braille, typing, etc.)
e. Techniques of daily living

Although every course taught was not covered specifically, those which were not covered are, for the most part, regarded as ancillary courses; e.g., fencing is not taught for its own sake but to assist the trainee to acquire skills needed for mobility.

(4) Social and leisure activities. An attempt was made to assess how far the trainee's present interests and involvements differed from those he had immediately before entering St. Paul's, and whether the present pattern approached more closely to his pattern before blindness.

(5) Relationship between the trainee and his family. Questions were asked to determine whether there had been any change in the trainee's mental status, or living arrangements since training and whether the latter reflected greater independence. He was also asked whether he felt that his family's attitude towards his blindness had changed. This was not an attempt to evaluate the "Family Seminar" (a 3-day conference held near the end of the program to which friends and relatives are invited). The outcome of this seminar would be a research project in itself and as it has not changed with the change in length of the program is not relevant to this study.

(6) Interviewer's impressions of the benefit of St. Paul's program to the trainee, and of his general appearance and behavior during the interview.

The assistance of the staff of St. Paul's was sought in compiling suitable questions, and they were given the opportunity to make corrections and additions when a draft questionnaire had been prepared. Dr. Sol Levine of the Harvard School of Public Health gave much valuable advice in the wording and general form of the questions. Dr. Eric Josephson of the American Foundation for the Blind also read the draft and offered helpful suggestions and criticisms.

Consideration was given to the idea of appending to these questions part at least of some standard psychological test designed to measure dependence v. independence and anxiety v. confidence. The latter was sought in particular as some State Counselors had described what they called "The St. Paul's Slump". They believed that trainees were very busy while at St. Paul's, learned many things and on their return home had unduly high hopes and expectations of themselves. When these proved to be false, they became very depressed. After consultation with several psychologists and examination of various scales, it was decided not to proceed with this idea for the following reasons:

(1) None of the scales examined which permitted of mechanical scoring seemed to cover the particular aspects envisaged.
(2) Any "open-ended" approach would require professional psychological interpretation.
(3) Even if such a measure could be found, it would relate only to the trainee's attitude at the time of interview; since no such comparable measurement had been made before training, it would not be possible to evaluate what change the training had made.

It was therefore decided not to attempt to measure these aspects of the trainee's attitude except insofar as they were reflected by his performance in various areas. There were a few exceptions to this, notably question 44, dealing with family's attitude as the trainee saw it and question 22, dealing with acceptance of help from strangers. These were composed after reading Fitting's Evaluation Scale and owe much to him.*

In addition to the questions covering the six areas mentioned above, the trainees were asked whether there had been any change in their visual acuity (question 5) and what their medical history in the intervening period had been (question 32).

It was suspected that by reason of the different time-lag between graduation from St. Paul's and interview these might differ between the two samples and be a possible source of bias.

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*Fitting, Edward A.: "Evaluation of Adjustment to Blindness." A.F.B. Pub. Res. Series No. 2, 1954.

(For final form of questionnaire, see Appendix 4.)

5.2.2. Subsample Selection

Those trainees given 12 weeks' training had already graduated some time during the four years preceding the grant period (1958-1961). The trainees attending during the grant period all received 16 weeks' training. Any follow-up comparison of the two lengths of training had a very serious bias: the time-lag between graduation and interview would be appreciably greater for the 12-week trainees than for the 16-week trainees. In an attempt to minimize this bias the last nine groups of the 12-week trainees and the first seven groups of the 16-week trainees were selected for interviewing, thus giving a potential of 77 and 65 graduates respectively. Prior inspection of physical data, grades, etc. had ruled out the possibility of a significant time trend in these characteristics, but the comparability of the two samples of trainees actually interviewed was also checked (see section on results below). This procedure did, in fact, help to reduce another extraneous source of variation - differences in staff members - but unfortunately not to any large extent.

5.2.3. Pretest

The provisional questionnaire was tried out by visiting trainees of the earliest groups (2-7), those in Massachusetts being chosen for reasons of economy. A total of 20 trainees was pretested. The wording of some questions was subsequently clarified and the question about cause and duration of blindness placed earlier as this gave the interviewer better orientation (he had not been given any information about the trainees, but some seemed to assume that he had). He was given a list of the newer courses together with the group of their introduction so that he could pre-edit question 4.

The pretesting gave the interviewer some experience in comparing St. Paul's graduates so that he could describe and rate them more effectively (last page of questionnaire). The same person completed all the final interviews.

5.2.4. Results and Discussion

The responses to all questionnaires were coded by one experienced coder. A random subsample was coded independently and the results were compared. The number of errors was small and they were almost exclusively confined to the responses which required interpretation. The overall accuracy was judged to be sufficient to warrant reliance on the coding without further checking.

Prior to tabulation a preliminary inspection of the code sheets was made and the questionnaires of those trainees whose vision had improved were scrutinized. This resulted in the rejection of one completed questionnaire (see "physical differences" below).

The final number of completed interviews tabulated was as follows:

		A	B
	Graduates	77	65
Not interviewed	Deceased	15	7
	Staff member	1	0
	Not traced	2	0
	Distance too great	5	2
	Rejected questionnaire	1	0
Completed interviews tabulated		53	56

The designation A for trainees who had 12 weeks' training and B for those who had 16 weeks' training is used throughout this section.

In addition to the responses to the questions, certain physical and other characteristics including I.Q. and average skills grade (weighted and adjusted) were coded and included on each trainee's punch cards. These characteristics were obtained from the information available in past records and were included so that the comparability of the two groups in these respects could be assessed. In addition, it was intended to break down the samples into subgroups if any of the results from the questionnaire seemed to demand further explanation; this was not done as no such indications were apparent.

Inspection of the tabulations for each question showed no apparent differences between sample A and sample B. Thus, it was not considered relevant for the purposes of this study to do more than summarize the results which are presented below. They have been grouped according to subject area, which in some instances differs from the order in which they appeared on the questionnaire.

5.2.4.1. Physical and other characteristics

The physical characteristics of those interviewed were compared to see whether any gross differences were present which would bias the responses. Factors considered were:

(1) age distribution
(2) cause of blindness
(3) amount of vision when at St. Paul's
(4) duration of blindness prior to St. Paul's
(5) weighted and adjusted average skill grade
(6) I.Q.
(7) sex (40 males in each group)

In addition to these factors for which information was obtained from records at St. Paul's, additional factors were obtained from responses to the questionnaire:

(8) changes in visual acuity since St. Paul's
(9) expectations of visual changes in the future

One trainee whose vision was improved by an operation one month after leaving St. Paul's has been excluded from the tabulations. Of the remaining eight whose vision had improved, in five instances the improvement was judged to be slight as these persons still travelled with a cane; in the remaining three instances the trainees had been asked by the interviewer to relate their answers to the period before their improvement (two in sample A, one in sample B).

None of these nine factors showed any differences between the two samples except that sample B contained a higher number of diabetics, having 23 compared with 14 in sample A. This difference, which approaches significance at the 5% level, can be attributed to the short life span of diabetics after they have become blind (only 50% of the male diabetics can be expected to live four years after entering St. Paul's) and is thus the result of the different time-lag before interview.

Where differences between the two samples are found, they are probably more closely related to this difference in time-lag than to differences in the length of program. The distribution of time between leaving St. Paul's and being interviewed was as follows:

	A	B
6 months - 1 year	0	24
1 - 2 years	0	22
2 - 3 years	13	10
3 - 5 years	40	0
	53	56

In some instances where this time effect would have been expected to produce differences in the responses of the two groups, they were not found. This is true of a further physical variable: illness or medical problems, occurring since St. Paul's, sufficiently severe to confine the trainee to bed for two or more days. The responses were:

	A	B
No illness	30	35
Once for 2 weeks or less	5	8
Once for more than 2 weeks	8	4
More than once, but total of less than 1 mo.	2	3
More than once, totalling more than 1 month	8	6
	53	56

Thus, there did not seem to be any obvious physical differences between the two groups that would indicate a difference in potential.

5.2.4.2. Trainee's opinion of the program

The first part of the questionnaire dealt with the trainee's opinion about the program. There was no difference between samples in the amount that the trainees felt that they had benefited or

been harmed by the program, the distribution being:

	A	B
Benefited Very Much	32	38
Benefited some or "Quite a bit"	17	15
Benefited Little	3	1
Ambiguous answer or no response	1	2
	53	56

Nobody claimed to have been harmed by it. Nor was there any difference in the reasons given for this response; the most frequent single reason being emotional or social benefit cited by a total of 37 persons, followed next by mobility, orientation and allied skills cited by 16 persons.

When asked whether in general they would have liked more training in any of the courses, the answers were as follows:

	A	B
Yes	40	39
No	12	17
Undecided	1	0

But when trainees were asked for each particular course whether they would have liked more or less, there was an indication that those in sample B were more satisfied with the amount of training they had received. The responses were scored as follows:

Much more = 1
Little more = 2
Same amount = 3
Little less = 4
Much less = 5

and an average was computed for each course given (see Table 5.1). Thus, an average of 3.0 would indicate that in general the trainees were satisfied with the amount of training they had received. Of the 21 courses (skill and attitude courses) the average score was higher for 17 courses in sample B. This is a significant proportion. If, however, the scores are examined more closely, it will be observed that for 7 out of 21 courses the average for both groups A and B is greater than 3, indicating that for both samples more trainees expressed a desire for less than expressed a desire for more. If these 7 courses are excluded, we have 14 courses where, on the average, the trainees of both samples felt they would have liked more. Of these 14 courses group B was more satisfied than group A in all except 2 courses, braille and typing.

If an overall average is computed giving equal weight to each course, the score for sample A is 2.8, and for B 2.9. The fact that the score for B approaches the value 3 or "same" so closely would seem to indicate that, on the average, the trainees of this

sample were satisfied with the amount of training they received, whereas those of sample A felt that a little more would have been beneficial. It must, of course, be remembered that the trainees of sample B knew when at St. Paul's that the 16-week program was an innovation. Because of this both groups were told by the interviewer that the purpose of the study was to compare 12 and 16 weeks. It might be that the trainees of sample A would have been less inclined to say that they wanted more had they not known that the alternative being considered was a longer program, not a shorter program.

At the end of the questionnaire after they had answered questions dealing with details of exactly how the training had affected them, trainees were again asked an overall question, "Would you say that in general you are able to deal with problems of blindness better, about the same, or worse?" In both samples there was an overwhelming response of "better" - 46 persons in sample A, 53 in sample B - and the reasons given by both showed the same emphasis on confidence and attitude rather than on skills alone. The same emphasis was apparent when the trainees were asked to name what they considered to be the most satisfactory and the least satisfactory aspects of the training. The responses which showed a remarkably similar distribution can be grouped into broad subject areas as follows:

	A	B
Most successful aspects		
Skill courses	16	15
Independence, attitudes, etc.	24	22
Skills and independence, attitudes, or general approval	11	15
One or more staff members	0	1
Did not mention anything	2	3
	53	56
Least successful aspects		
Vocational	5	0
One or more skill courses	7	11
Attitude courses	1	7
Other objections	5	10
Could not mention anything	35	28
	53	56

It is remarkable that at this point a very high number of trainees could not think of any unsuccessful aspect. When, however, the question was asked if there was anything about St. Paul's that should be changed, there was a high response. Ignoring all references to specific courses or the length of the program, the number of suggestions per trainee was as follows:

	A	B
No changes suggested	18	14
One change suggested	18	17
Two changes suggested	12	15
Three or more "	5	0
	53	56

The suggestions most frequently covered the following areas (in decreasing order of emphasis:

1. Changes in physical aspects of the building, beds, cleanliness, etc.
2. Changes in the food.
3. Changes in the restrictions at week ends, more contact with other people, more recreational facilities, etc.
4. Introduction of job placement, occupational training.
5. Homogeneous grouping of trainees by age, interest, background, etc.

Notwithstanding this large number of suggestions for improvement, it was apparent that most of the trainees were pleased with the program. Asked what advice they would give a person similar to themselves who was thinking of applying to St. Paul's, their responses were:

	A	B
Have already advised people to go	5	2
Would advise to go without reservation	41	42
Would advise to go with reservation	4	11
No opinion expressed	3	1
	53	56

From the responses to these questions it seems that there is no difference in the distribution of opinions expressed by those who had 12 weeks' training compared to those who had 16 weeks' training when they were speaking of the program as a whole. When the trainees were asked specifically for each course whether more or less training would be desirable, there seems to be some indication that those who had 16 weeks were more satisfied with the amount they had.

5.2.4.3. Employment and income

It was expected that more of sample A would be employed as they had had a longer time in which to secure a job, but in fact the difference was not very great.

	A			B		
	Males	Females	Total	Males	Females	Total
Employed full time	15	3	18	11	0	11
Employed part time	6	2	8	2	0	2
Training (including college)	4	0	4	2	4	6
Does not want job	4	7	11	9	8	17
Wants job	11	1	12	16	4	20
	40	13	53	40	16	56

That the differences were indeed due to the time-lag may be seen by the following breakdown of employment:

Groups	Number Inter-viewed	Stand or Store	Machinery Operation or Main-tenance	Profes-sional or Semi-prof.	Shel-tered Shop	Other	Total Em-ployed
8-12	26	2	2	3	2	4	13
13-16	27	3	0	7	1	2	13
All sample A	53	5	2	10	3	6	26
17-20	29	5	4	0	0	2	11
21-23	27	0	1	1	0	0	2
All sample B	56	5	5	1	0	2	13

When asked about their income, half the trainees in each group said that their present income was 50% or less than their income before blindness. In group A 21 trainees and in group B 15 said that their present income was better than before St. Paul's; 26 and 38 respectively said that it was the same. These responses are obviously linked with employment. St. Paul's does not attempt to give vocational training and these responses are considered primarily because it was thought that the dissatisfaction of not being able to secure a wanted job would be likely to color the responses to other questions. If such an effect were present, the tendency would be for more dissatisfaction to be found in sample B.

5.2.4.4. Application of skills

a. Housekeeping. When housewives and those living alone were asked how much they were able to do now compared with before St. Paul's, nobody said less; all responses were "as much" or "more". There were a few more who responded "as much" among sample B (6 out of 21 in sample B, 1 out of 13 in sample A), but when the details of whether they did all, some or none of each particular aspect were considered, there were no marked differences between the two groups: 49% of sample A did all their cleaning, cooking, laundry, ironing, mending and shopping compared with 46% in sample B.

All those who were not housewives or living alone were asked how much they helped in the house in the three different periods. Their responses were rated:

Much = 1
Some = 2
Little = 3
None = 4

and the averages for 40 in sample A and 35 in sample B were as follows:

	A	B
Before blindness	2.7	2.8
Before St. Paul's	3.1	2.8
After training	2.7	2.4

Here again, the average amount of improvement between before and after training is the same for A and B, 0.4, although it is surprising that the differences between before and after blindness are not greater.

b. Shop. Applying the same rating to the responses to the question of whether the shop course helped much, some, little, or none, there is found to be an average score of 2.0 for sample A and 2.2 for sample B, with again a very similar distribution of responses. When the application of shop skills is considered, only one person in each sample who had not used shop tools before blindness used them afterwards. Of those who had used tools before blindness (and had been blind for a while before going to St. Paul's), the responses of those who had given up during this intervening period and of those who had kept on using them should be considered separately.

	A	B
Gave up but used again after training	7	3
Gave up and did not resume " "	5	9
Used all along	12	14
Gave up after training	0	2

Here the difference in time-lag before interview may account for the rather greater use of tools by sample A.

As the objective of the shop course is wider than teaching the use of tools only, the trainees were not only asked if the course was helpful but also asked to state in what way it was helpful. These responses were considered for both those who had done repairs at home (either alone or with someone else) and those who had not done any repairs:

	A	B
Had done repairs and mentioned skill	17	17
Had done repairs and mentioned confidence	15	11
Had not done repairs and mentioned skill	2	3
Had not done repairs and mentioned confidence	12	12
Other responses or no response	7	13
	53	56

Once again the two samples are remarkably similar.

c. Mobility. The use of the long Hoover cane is the method of mobility taught at St. Paul's. None of the trainees entering the program had had prior instruction in its use. The extent to

which they use it afterwards seems then to be a very direct measurement of how far they put into practice a specific skill learned during the program. In both samples the great majority used it either alone or in conjunction with other means.

	A	B
Hoover only	16	19
Hoover and other means	24	27
	40	46
Other cane only	3	3
Guide dog only	5	1
Human guide only	0	3
Combinations excluding Hoover	2	0
Nothing	3	3
	53	56

There is also a similar distribution between the two groups in the amount of travelling done before and after training. This has been considered in terms of travelling alone or with someone else in three areas: near home, in crowds, and on public transportation. The increase in the numbers travelling alone, compared with before training, in sample A is from 22 to 49 near home, and of these 49, 43 also travel alone in crowds compared with 8 formerly, and 40 use public transportation alone. In sample B the increase in travelling alone near home is from 24 to 47 and 30 of these also travel alone in crowds compared with 10 formerly, while 33 use public transportation alone. Thus, while the members in sample B who use the Hoover cane are greater than in sample A, the amount of independent travel is rather less. In other words, there is no consistent difference between the two samples in the benefits derived from the mobility training.

Consideration was also given to the numbers who shop for food and clothes alone after training and comparison was made with the numbers who did so before training. In sample A there were 40 who did so "never" or "rarely" before training and this was reduced to 18 after training; in sample B the corresponding change was from 43 to 27. Similarly, the numbers accepting help when offered were similar in the two samples and so were the specific obstacles which the trainees considered constituted the greatest difficulties in travelling alone. In sample A 50 out of 53 persons considered they got around better after training; in sample B 47 out of 54. In all these comparisons the distribution of responses is remarkably similar between the two samples and the conclusion must be drawn that the trainee's mobility is, in general, increased by training, but the amount of increase seems to be independent of the length of training.

d. Communication skills. The trainees were asked whether they now used each communication skill much, some, little or none, and how much they used it before St. Paul's. As different persons' ideas of "much" may vary considerably, these categories have been

summarized below in terms of the overall differences between before and after training. (The more detailed categories did not show any outstanding features except that only one person of each sample claimed at any period to use a human reader "much".)

In the following tabulation the numbers who used a particular skill less after training (never more than 6 for any aspect in either sample) have been subtracted from the numbers using it more to give an estimate of the total amount of gain in each sample. The differences "increase minus decrease" are as follows:

	A	B
Braille	26	31
Typing	36	33
Handwriting	16	4
Talking Book	18	12
Human Reader	11	5
Maximum possible score for each course	53	56

Thus, in four instances sample A showed a greater preponderance of persons increasing their use of a particular skill than did sample B, whereas for Braille, this position was reversed. It would not be reasonable to consider each subject separately since to a certain extent Braille, handwriting and typing are alternative means of transmitting information and all except typing and handwriting are means of obtaining information. Considered in this way, it may be said that the two samples do not differ appreciably in the extent to which the training increased the use of skills for transmitting and receiving information.

In sample A, 12 persons, and in sample B, 13 received further instruction in Braille after leaving St. Paul's, and an additional 14 persons in sample A, 10 in sample B, claimed to have increased their skill by practicing on their own. In typing one person in each sample received further instruction and 21 in sample A and 10 in sample B had increased their skill by practicing. As 11 in sample A and 10 in sample B said that they did not type either before or after training, and 1 and 3 respectively had typed less since training, it seems that there was less incentive to type among trainees of sample B, whereas there was no difference between the samples in their use of Braille. This difference in the numbers who practiced typing is statistically significant ($0.02 > p > 0.01$) but probably is only a reflection of the different time-lag before interview.

e. Techniques of daily living and general skills. Questions were asked about a number of techniques used in daily living which (as far as can be judged) have consistently been at least mentioned during the training program. As responses were obtained from all trainees interviewed, it will be sufficient to summarize the numbers who claimed to use these techniques.

	A	B
Used a method of identifying clothes	13	12
Used a method of identifying canned goods, etc.	15	18
Used a method of identifying paper money	40	36
Possessed and used a Braille watch	44	40
Possessed and used other Braille devices	16	13

Again, no appreciable difference between the two samples was discernible, nor were there any differences in the numbers who had adopted a method suggested at St. Paul's compared with those who used some other method.

Considerable practice and encouragement is given to the trainees to pour hot and cold liquids. In sample A four persons did not pour after training, 11 poured hot and cold for themselves only, one person poured hot and cold for himself but only cold for others and the remaining 37 poured both hot and cold for themselves and others. In sample B only one person did not pour, 10 poured hot and cold for themselves only, 2 only poured cold for themselves and the remaining 43 poured both hot and cold for themselves and others. In other words, out of a total of seven persons who did not pour hot liquids at all after training, four were in sample A and three in sample B.

These questions were followed by two rather general questions dealing with matters discussed in the course "Principles of Daily Living". One dealt with the possession and use of free passes for public transportation systems (an indication of a lack of independence according to some people), and the distribution showed no difference between the samples. The other was a request to the trainee to describe his appearance and the response was rated by the interviewer. This again showed similar distribution of scores between the two samples and an average of 4.4 for sample A and 4.5 for sample B out of a possible maximum of 8.

It would perhaps be relevant to include here the interviewer's observations on the trainee's appearance and manner as these are matters discussed in the classes "Techniques of Daily Living Principles" and "Spoken Communication". When the outline for this description was prepared, it was intended to visit each trainee by appointment. Owing to administration difficulties, the actual hiring of an interviewer was delayed and so it was decided to visit the trainees without a prior appointment as this seemed to be the most time-saving method. Questions on the trainees' attire became irrelevant as some wore only a bathing suit and others were busy in the house and attired in old clothes. The only information coded, therefore, was on the trainee's sitting and standing posture: whether his movements were precise and well-oriented and he seemed to be alert and look at the interviewer; whether he had a pleasant manner, shook hands, and his appearance was good insofar as it did not reflect neglect or lack of knowledge of current fashions; and finally, whether he used the word "blind". The results may be summarized briefly: all except five trainees in sample A and seven in sample B were relaxed. All except ten in sample A and

12 in sample B moved with precision, looked at the interviewer, and seemed to be alert and well oriented. In sample A 47 had a good appearance and pleasant manner, and all but 6 of these shook hands with the interviewer. In sample B 51 had a good appearance and pleasant manner, and all but 15 of these shook hands with the interviewer. In sample A 51 persons used the word "blind"; 50 used it in sample B.

5.2.4.5. Family aspects and social activities

For the most part the questionnaire attempted to measure the trainees' attitudes toward blindness only insofar as they pertained to behavior. One point of departure from this approach were the questions dealing with their family's attitudes as the trainees saw them. Before considering these responses, it is necessary to glance briefly at the trainee's marital status and living arrangements to ensure that "family" would, on the average, mean the same thing to members of each sample.

The number of persons in sample A married at the time of interview was 25, compared with 36 in sample B; this difference approaches significance at the 5% level. There were no apparent differences in the other categories of single, widowed, separated and divorced, although it is interesting to note that since training five persons had married, one became widowed and two divorced in sample A, whereas only one had married and one became divorced in sample B, but this is another instance where the time-lag is an important factor. There was no difference in living arrangements between the two samples, 8 persons in sample A now living alone in an apartment and 9 in sample B.

In some instances the interviewer was unable to speak with the trainee alone and so did not ask the questions relating to the reaction of the trainee's family to his blindness; these instances have all been included below under "no response", together with a few vague or evasive answers. Where clear responses were obtained, they were as follows:

Q. 44(a) Did you feel that your family expected too much of you when you first became blind? Do you now?

	A	B
No to both questions	38	42
Yes at first, no now	2	5
Yes now	1	3
No response	12	6
	53	56

(b) Do you feel that your family did too much for you when you first became blind? Do you now?

	A	B
No to both questions	18	31
Yes at first, no now	18	14
Yes now	5	5
No response	12	6
	53	56

(c) When you first became blind, did you feel that your family didn't let you think for yourself? Do you now?

	A	B
No to both questions	27	36
Yes at first, no now	10	10
Yes now	4	3
No response	12	7
	53	56

(d) Before St. Paul's did you have the feeling that your family was embarrassed by your blindness? Do you now?

	A	B
No to both questions	32	39
Yes at first, no now	5	4
Yes now	3	2
No response	13	11
	53	56

These responses have been given in some detail as, although they do not show a difference between the samples, they do give an indication of the extent to which the trainees felt that their family's attitude towards their blindness had changed. In this regard it is also interesting that when asked whether St. Paul's made any differences to their relation with their family 18 trainees of sample A mentioned the Family Seminar, 15 favorably, and in sample B, 22 mentioned it, 18 favorably. The general distribution of responses in this area did not show any difference between the two samples.

After being asked specific questions about their social and leisure activities during the three periods of their life, the trainees were asked directly whether in general these had changed in any way as a result of St. Paul's and, if so, in what way. In sample A, 25 claimed that they had increased; in sample B, 32 made this claim. The same similarities were noted between the two samples in the responses to the specific questions, although the distribution among different relative patterns of behavior during the three periods was extensive for each aspect. The responses did indicate that very few, if any, trainees led very secluded

lives: only two persons in sample A and three in sample B did not eat out in public places and more than half of each sample did so more than once a month.

5.2.4.6. Interviewer's impressions

The interviewer managed to establish a very good relationship with the trainees, and gained an overall impression from their responses as to how much they had profited from the course, in terms of both skills and attitudes. He rated them according to his impressions. He was, of course, aware of which trainees had 12 and which 16 weeks of training, but, as he was not a regular member of St. Paul's staff, had no reason for bias in either direction. His ratings were as follows (one person omitted in each sample):

Rating	Amount of Improvement	Attitude		Technique	
		A	B	A	B
1	None	4	4	3	4
2	Little	9	13	25	22
3	Some	18	18	19	24
4	Much	21	20	5	5
		52	55	52	55

Here again, the distributions for the two samples are very similar. These ratings were compared with the average skill grade that the trainees obtained at St. Paul's. There was no apparent correlation between attitude rating and grade for either sample. There did seem to be some correlation between grade and skill rating in sample A but not in sample B, but the results were not sufficiently marked to warrant further investigation.

5.2.5. Conclusions from the Questionnaire

In view of the number of comparisons made and that a statistically significant difference would be expected to appear by chance 1 in 20 times with the 5% criterion adopted, no great importance can be attached to the finding that more trainees of sample A practice typing than did those of sample B (21 compared with 10). The differences in numbers married (A, 25; B, 36) and blinded by diabetes (A, 14; B, 23) which both approached significance at the 5% level were not considered to introduce important bias in the results. This leaves only the difference in numbers employed (which seems to be greater in sample A because of the greater length of time which they had in which to secure a job) and the greater satisfaction with the amount of training shown by sample B. The general conclusion must therefore be reached that no difference in performance could be found between samples A and B. It should be borne in mind of course that employment itself would tend to lead to greater activity and so one might expect sample A to be more active, other things being equal. It would have been interesting to have visited the relatives of the deceased in order to discover whether the generally satisfactory outcome also applied to those in the last stages of diabetes, but this would really be a separate study.

A negative finding is always rather uninteresting, but although the responses to the questionnaire did not show any different results from the 12 or 16 weeks' training, they did show that for most trainees the training had been "effective" and met with general approval.

Table 5.1. Trainees' Opinions of the Amount of Training They Would Have Liked in Each Course

Course	Trainees of Sample A who would have liked: (1) Much More	(2) Little More	(3) Same	(4) Little Less	(5) Much Less	No Response	Aver. Score	Trainees of Sample B who would have liked: (1) Much More	(2) Little More	(3) Same	(4) Little Less	(5) Much Less	No Response	Aver. Score
Mobility	18	17	17	1	0	0	2.02	11	22	22	1	0	0	2.23
Fencing	4	17	23	8	0	1	2.67	2	10	34	6	2	2	2.93
Visualization	14	21	14	3	1	0	2.17	6	20	23	6	0	1	2.53
Kinesthetics	2	4	20	13	5	9	3.34	3	9	18	12	14	0	3.45
Imagery Stimulation	2	10	16	11	3	11	3.07	1	11	21	11	5	7	3.16
Spatial Orientation	12	16	15	7	1	2	2.39	7	20	27	1	0	1	2.40
Braille	8	18	15	8	3	1	2.62	12	17	23	0	3	1	2.36
Handwriting	1	11	30	9	1	1	2.96	2	9	35	4	5	1	3.02
Typing	3	25	18	5	1	1	2.54	10	16	27	3	0	0	2.41
Shop	9	8	26	10	0	0	2.70	3	13	31	7	1	1	2.82
Shop Group	2	9	20	18	1	3	3.14	0	5	24	15	11	1	3.58
Housekeeping	4	7	28	10	3	1	3.02	4	16	20	11	5	0	2.95
T.D.L. - Drills*	2	14	27	6	1	3	2.80	4	11	28	10	2	1	2.91
T.D.L. - Principles*	1	14	25	4	1	8	2.78	2	13	28	7	2	4	2.88
Personal Hygiene	2	13	26	5	3	4	2.88	1	10	32	6	5	2	3.07
Attitudes and Analysis	6	11	25	8	2	1	2.79	1	7	27	13	6	2	3.30
Group Psychotherapy	6	6	21	13	6	1	3.13	0	8	32	8	5	3	3.19
Legislation and Citizenship	4	15	25	7	2	0	2.77	2	14	34	3	3	0	2.84
Group Vocational Counselling	3	7	15	10	5	13	3.18	1	7	27	7	6	8	3.21
Gripe	0	2	22	10	5	14	3.46	1	3	32	10	4	6	3.26
Self Appraisal	6	15	24	6	0	2	2.59	1	14	29	6	2	4	2.88
Totals	109	260	452	172	44	76	2.79	74	255	574	147	81	45	2.92
Newer Courses														
Sensory Training								3	16	25	5	2	5	2.75
Spoken Communication								1	12	20	15	4	4	3.17

*T.D.L. = Techniques of Daily Living

6. General Conclusions and Discussion

The conclusion that must be drawn from both the analysis of grades and the questionnaire is that most of the trainees benefit from the training at St. Paul's, but that the numbers who benefit and the amount of benefit were unchanged when the program was extended from 12 to 16 weeks. There is some indication of continued improvement in the last four weeks of the longer program in the results of some of the sensory tests, but the validity of these has not been sufficiently well established for any great weight to be attached to this finding. Indeed, even if the tests were well standardized and of known value, questions would still remain: on the one hand, whether the improvement in 11 weeks of a 12-week program might not be at a different rate than in 11 weeks of a 16-week program, and on the other hand, whether once the trainee has been made aware of the importance of the individual senses he might not continue to put what he has learned into practice and improve without further instruction.

In a study such as this where the comparison of two groups did not show any difference it is necessary to consider first of all whether this apparent similarity between the two groups was real. Was there really no difference or was the apparent similarity an artifact occasioned by using methods of assessment that were imprecise or by omitting from consideration entirely aspects that were of importance. Throughout this report attention has been drawn to these considerations. Possible sources of bias have been indicated and the subjective nature of much of the data has been stressed. The lack of information on changes of course content, and on grading criteria, the lack of measurements of psychological variables, the lack of standardized background information on each trainee or even of uniform medical reports has been mentioned. Some of the data that were available could not be utilized because if an attribute or physical defect, for instance, is not mentioned in a narrative report it is not possible to tell whether this was an unintentional omission or whether, indeed, it was not present. These are of course inevitable failings of a study utilizing past records which were collected for some other purpose.

If when all these limitations are borne in mind the conclusion of no differences between 12 and 16 weeks is still considered valid, then consideration turns to the question of why there was no difference. There are several possibilities. One of these is contradicted by the findings of the study, namely, that neither length of training has any effect. The amount of improvement claimed by the trainees themselves in answer to the questionnaire confirms the observations of the staff during the program that development of skills and confidence does generally occur. Another possible explanation is that the 16-week program did not differ sufficiently from the 12-week program, that the content was the same but the pace was slower. There seems to be some justification for believing that the content was not greatly increased, although the lack of 12-week lesson plans makes this rather a matter of guess-work. It is not true, however, that the amount of

instruction given in terms of hours per week was diluted; it was in fact slightly increased. The same content but increased hours of instruction would be expected to lead to a different outcome if speed of learning were a deciding feature. This leads to the third possibility, namely, that the training is only effective for some people, and that others lack either the motivation or the ability to profit from it.

To determine the characteristics of those trainees who do or do not benefit from this type of training is really outside the scope of this study as it would require different methods of analysis. Although a few comparisons between certain personal characteristics and grades have been made, these did not demonstrate any association sufficiently strong to be of assistance in predicting outcome. Consideration of the conclusion obtained does lead, however, to two further questions: "which persons profit most and which least from this training?" and "what changes in the training program would be preferable to a change in length in order that the optimum amount of benefit from the training could be achieved?" These questions are matters that can only be answered after further research.

Suggested Further Developments

In recent groups more persons have wished to enter St. Paul's than it has been possible to accept. The answer to the question "what are the characteristics of the person who will profit most?" is therefore pertinent when it comes to screening applicants. To define the person who will profit most is, of course, different from defining the person who will be the most skillful and well adjusted afterwards. To define the latter, consideration need only be given to final status; to define the former needs precise measurement of performance before training, at the end of training and at some fixed period after training. Besides measuring performance the characteristics themselves must be measured. It has been found in this study that it is unlikely that the answer can be obtained from considerations confined to age, sex, blindness factors and I.Q. alone. Measurements of characteristics should include other sensory functions, physical fitness, motivation and other psychological factors and more work needs to be done on hearing.

To accomplish such an objective would in fact require a multitude of measurements; otherwise the answer would, as in the present study, have to be so heavily qualified as to be almost useless. It seems to be a much more manageable problem to consider one or a limited number of attributes at a time and investigate these thoroughly. A beginning has been made in the development of sensory tests. There is a great need for the development of similar tests in both the physical and psychological areas. If sense of touch could be accurately measured, it would be relatively simple to see how far this was associated with an ability to learn to read Braille, and subsequently to use Braille. An audiogram provides a measure of hearing acuity; it remains to develop tests

that will measure progress in utilizing auditory cues. Hypothetically it might be that persons with a poor sense of touch or a markedly reduced hearing loss are unable to profit fully from this type of training program. It might be investigated whether a trainee with many physical ailments is unable to absorb so many hours of instruction each day. Or whether - another hypothesis - a trainee who has spent a large part of his life without assessing his own strengths and weaknesses may be so appalled by consideration of the many losses that blindness can incur that he is unable to evaluate which of them apply to him and what resources he has for coping with them.

To try to develop tests with the main purpose of finding which persons cannot benefit from the program is an area of investigation which would, if successful, aid in ensuring that the training was made available only to those who could most benefit by it.

Another possible area of investigation raised by the present study deals with the possibility of initiating other changes in or adaptation in the training and measuring any changes in the overall benefit derived. The first possibility that the comparison of 12 and 16 weeks brings to mind would be to investigate the advantages of an alternative use of the last four weeks. For instance, it might be possible for the present course content to be covered in the first 12 weeks and in the last four weeks trainees could perhaps be given additional instruction in those areas where their individual need was greatest. Another alternative might be for those who were considered to have reached a satisfactory level to leave at the 12th week and only those who needed further training remain. Such research suggestions are, of course, tending towards a suggestion advanced by several of the trainees, that perhaps more homogeneous grouping of trainees would prove to be advantageous. Other changes that might be investigated would be to conduct a few groups with certain controversial features of the program omitted so that their efficacy could be individually assessed. Alternatively the introduction of specific changes could be investigated, such as the introduction of repeated drills to develop sensory awareness accompanied by independent testing of results. Great effort is made by the instructors not to ask the trainees to do anything which is undignified and most of the training is devoted to practical applications of skills or else to drills, such as pouring, where the practical application is immediately obvious. The trainees, however, for the most part showed great interest in the sensory tests given where the ultimate objective in many instances was not immediately obvious without explanation. In fact, care had to be taken to keep the apparatus out of their way between tests so that they did not practice with it on their own as some of them suggested.

The advantage of a more limited research project of this nature would be that whatever change was introduced could be given to alternate groups or possibly to half the members of each

group so that comparisons could be more easily made. There would, of course, still be a need for accurate assessments to be made, but the comparisons would not be as inextricably confused with other factors such as changes of instructors and changing attitudes of existing instructors as they were in the study of 12 and 16 weeks. It would also be desirable for measurements to be made by an observer who was not emotionally involved in the program. A further requirement in the design of any research project that involved alteration in the program would be that the proposed change affected the smallest number of trainees possible until a significant result was obtained. Of the 109 past trainees interviewed all except three felt that they had benefitted to some degree by the training and 63 could not mention any unsuccessful aspect of the program they had experienced.

APPENDIX 1

PHYSICAL CHARACTERISTICS, METHODS OF CLASSIFICATION AND DISTRIBUTION OF THE TRAINEES

This appendix gives the composition of the two samples of trainees regarding numbers, age and sex, blindness factors, hearing ability, I.Q. and physical handicaps other than blindness. The distribution tables are preceded by an explanation of the method of classification where this is not immediately apparent: blindness factors involved some arbitrary judgments; hearing involved the development of a method of classifying audiograms; and physical handicaps involved searching the records for certain items rather than a rigid classification.

Table 1. Numbers in Each Sample - Number of Persons Entering and Completing Each Group

Group Number	Date Group Entered	Number Entering	Date Group Left	Number Completing	Incompletes
2	5-26-54	6	8-17-54	6	0
3	9-12-54	10	12-4-54	10	0
4	12-5-54	10	2-26-55	8	2
5	2-27-55	10	5-21-55	10	0
6	5-22-55	9	8-13-55	7	2
7	9-11-55	10	12-3-55	10	0
8	12-4-55	9	2-25-56	9	0
9	2-26-56	9	5-19-56	9	0
10	5-20-56	10	8-11-56	9	1
11	9-9-56	10	12-1-56	9	1
12	12-2-56	6	2-23-57	5	1
13	3-3-57	10	5-25-57	10	0
14	5-26-57	10	8-17-57	10	0
15	9-8-57	9	11-30-57	8	1
16	12-1-57	10	2-22-58	8	2
Total in Sample A		138		128	10
17	3-3-58	10	6-20-58	8	2
18	7-14-58	10	11-1-58	8	2
19	11-3-58	10	2-22-59	10	0
20	3-2-59	10	6-19-59	10	0
21	7-13-59	10	10-30-59	10	0
22	11-2-59	10	2-19-60	9	1
23	2-29-60	10	6-17-60	10	0
24	7-11-60	10	10-28-60	10	0
Total in Sample B		80		75	5

Table 2. Age and Sex Distribution in the Two Samples

Age Group	Number of Persons						Total	
	Sample A			Sample B			No. Persons	%
	M	F	Total	M	F	Total		
15-24	14	5	19	5	2	7	26	12.81
25-34	17	5	22	14	4	18	40	19.70
35-44	29	6	35	18	6	24	59	29.06
45-54	22	6	28	11	6	17	45	22.17
55-64	12	9	21	5	2	7	28	13.79
65-74	2	1	3	0	2	2	5	2.46
Total	96	32	128	53	22	75	203	99.99
Mean Age	40.73	43.75	41.48	39.43	43.64	40.67		

Blindness Factors (Tables 3-5)

Cause of blindness

This classification was made from the report of the ophthalmologist who examines each trainee on entry to St. Paul's and obtains an eye history from him. Where loss of vision in the two eyes was from different causes, the cause in the second eye was considered to be the cause of blindness. Similarly, when a series of causes was present for the same eye the final cause was used for this classification. Initially all causes were tabulated separately, but for purposes of analysis only the six most frequent causes were considered:

1. Diabetes: Included here are retinopathies where diabetic origin was indicated as definite or probable. Excluded are diabetics blind from other causes.

2. Trauma: Included here are all forms of violence such as gunshot wounds, chemical explosives and automobile and other accidents,; also one instance of bad alcohol.

3. Glaucoma: Included here are all those cases where glaucoma followed either ill-defined visual difficulties or defined difficulties, i.e., cataract extractions, which do not usually lead to blindness. Excluded are those cases where glaucoma followed any of the other causes of blindness listed above, i.e., diabetes.

4. Detached Retina: Included here are cases where the detachment followed cataract extraction, myopia or other eye disease, as well as cases with no previous history of visual difficulties.

5. Retinitis Pigmentosa: This always seemed to be a straightforward diagnosis.

6. Uveitis: Included here are cases of sympathetic blindness in a second eye and also cases of primary uveitis followed by cataracts and other complications.

7. Other: This includes blindness following removal of brain tumor, malignant myopia, optic atrophy, macular degeneration, Eales' disease, ocular pemphigus, retrolental fibroplasia, hypertension and cases where the cause was not determined or the history was too complicated for a single cause to be assigned.

Degree of Vision

When the ophthalmologist examines each trainee at the beginning of the program he determines how much remaining vision the trainee has, if any. There are two aspects defining legal blindness in Massachusetts, visual acuity of 20/200 or less and

restriction of the visual field to such an extent that the subtended angle is less than 10°. Although there is a standardized procedure for categorizing those whose visual acuity is better than legal blindness, for those whose vision falls below this level the method used varies and is sometimes difficult to interpret. Nevertheless an attempt has been made here to use this information. Apart from acuity of vision there is also the consideration of limitation of field. Many trainees who are legally blind from disease or detachment of the retina have a small area of the retina which is still functioning, sometimes sufficiently well for them to be able to read a newspaper if they hold it in such a position that they can get a few letters at a time into their restricted field. In most instances the prognosis for retention of this type of vision is poor and measurements of the extent of visual field are not available for trainees at St. Paul's. All trainees entering St. Paul's have vision considerably worse than that defined as legal blindness. In one instance a trainee who approached this level was accepted but discontinued the program because of the policy of St. Paul's that all persons with residual vision must wear "occluders" during training so that they learn to function without any assistance from sight or even light perception. After examining the records the descriptions of visual acuity were grouped into the following gross categories, which are based on the acuity of the better eye.

1. No Vision: This includes all persons who did not even have light perception and were consequently not required to wear occluders at St. Paul's.

2. Light Perception: In the records this may be described qualitatively as "questionable", "poor", "good" or some other term, but it was not felt that these qualifications were sufficiently accurate to permit subdivision; thus all persons with low vision are included in this group unless there is an indication that they can make out objects or shadows.

3. Hand Motion or Shadows: The description may be merely that the trainee can make out shadows or that he can see hand motions at distances up to one foot. In one case the description was "hand motion at one to two feet".

4. 2/200-3/200: The next category is often expressed as the ability to count fingers at so many feet. It has been assumed that ability to count at x feet is equivalent to x/200 in the usual notation. Thus ability to count fingers at distances up to 3 feet has been considered as falling in the category 2/200 to 3/200 and has been included with those so described. All relative data have been equated to a 200 baseline.

5. 4/200-80/200: Similarly this group includes finger counting from three-to-four feet to ten feet, as well

as those whose vision was expressed as a fraction greater than 4/200, but less than 20/200. Also included is one trainee with acuity of 80/200 in a very small field.

6. Unknown: In this group are included those where no estimate of acuity was given or where only the distance when wearing a glass was given.

When the two samples are compared a χ^2 value of 8.76 is obtained with 5 degrees of freedom, and the probability of this arising by chance is between 0.2 and 0.1. If the "unknown" category is discounted we have a χ^2 of 5.38 with 4 degrees of freedom for which the probability is between 0.3 and 0.2. Thus there is no significant difference between the two samples in the amount of visual acuity of the trainees.

Duration of Blindness

Information was obtained from each "Final Evaluation". In some instances, where this was ambiguous or conflicting dates were given, recourse was made to the "intake" material sent to St. Paul's by referring counselors prior to the admission of the trainee. When these sources did not define the date of blindness accurately somewhat arbitrary divisions had to be made.

In all instances where loss of sight occurred consecutively in each eye, the date when the loss occurred in the second eye was used. When the date for the occurrence of blindness from diabetes was only given in terms of visual difficulty over a span of years the later date was chosen as representing the date of onset of blindness; blindness usually seems to occur within two years from the first difficulties of vision caused by this disease and can occur quite suddenly from a retinal hemorrhage. When a decision had to be made for retinitis pigmentosa, the earlier date was selected as the rate of loss of vision is much slower with this disease and by the time the trainees reached St. Paul's it was reduced beyond the legal level. In other instances the date where employment was terminated because of visual difficulty was taken as the date of onset of blindness.

Where the onset of blindness was sudden, as when due to trauma or a brain operation, there is no doubt about the date but this is true for only 13 persons of the 128 considered in Groups 2-16. When the disease brought blindness rapidly and the trainee came to St. Paul's within two years of the onset of blindness the date can be established with some certainty. Consequently the intervals of one year are reasonably accurate. For slower loss of vision and for persons who had been blind for some years before entering St. Paul's it is more difficult to establish a definite date and so five-year categories are used for those blind more than five years before entering St. Paul's and less than 25 years.

This leaves in Samples A and B seven and two persons respectively who had a record of poor vision all their life or had been blind for more than 30 years, and four and three persons respectively who had a gradual onset for whom there was no date given.

The distribution of the two samples between these duration categories is shown in Table 5. If the "unknowns" are excluded the χ^2 value for the remaining categories is 16.6895 with 7 degrees of freedom. The probability of this occurring by chance lies between 0.01 and 0.02, indicating that there is a significant difference between the samples. Further inspection shows that the greatest percentage difference between the samples occurs in the first category "Less than 1 year"; this category accounted for only 5% of Sample A but 20% of Sample B.

Table 3. Blindness Factors - Causes of Blindness in the Two Samples

	Number of Persons			%
	Sample A	Sample B	Total	Distribution
Diabetes	47	32	79	38.92
Trauma	14	9	23	11.33
Glaucoma	12	10	22	10.84
Detached Retina	12	5	17	8.37
Retinitis Pigmentosa	12	5	17	8.37
Uveitis	10	1	11	5.42
Other	21	13	34	16.75
Total	128	75	203	100.00

$\chi^2 = 5.6651$ with 6 d.f.; $0.50 > p > 0.30$.

Table 4. Blindness Factors - Degree of Vision in the Two Samples

	Number of Persons			%
	Sample A	Sample B	Total	Distribution
No vision	26	12	38	18.72
Light Perception	38	29	67	33.00
Hand Movements	16	14	30	14.78
2/200-3/200	23	7	30	14.78
4/200-80/200*	16	12	28	13.79
Unknown	9	1	10	4.93
Total	128	75	203	100.00

$\chi^2 = 5.38$ with 4 d.f.; $0.3 > p > 0.2$.

*Only one person greater than 20/200 and this was in a very restricted field.

Table 5. Blindness Factors - Duration of Blindness in the Two Samples

	Sample A		Sample B		Total	
	Number Persons	%	Number Persons	%	Number Persons	%
Less than 1 year	7	5.47	15	20.00	22	10.84
1-1.9 years	28	21.88	12	16.00	40	19.70
2-4.9 years	37	28.91	21	28.00	58	28.57
5-9.9 years	18	14.06	8	10.67	26	12.81
10-14.9 years	11	8.59	11	14.67	22	10.84
15-19.9 years	9	7.03	2	2.67	11	5.42
20-25.9 years	7	5.47	1	1.33	8	3.94
Always poor or more than 30 years	7	5.47	2	2.67	9	4.43
Unknown	4	3.13	3	4.00	7	3.45
Total	128	100.01	75	100.01	203	100.00

$\chi^2 = 16.6895$ with 7 d.f.; $0.02 > p > 0.01$.

Hearing (Tables 6-9)

Classification of Audiograms

A single audiogram is taken for each trainee at the beginning of the program. If any marked loss is apparent the trainee is sent for a complete examination and, if necessary, given treatment. Sometimes the treatment involves removal of wax and a second audiogram shows improvement over the first. Therefore, where more than one audiogram is available for a trainee the later one has been used for the following classification. The process of grouping the audiograms into homogeneous groups was done in three stages. The first stage was to divide the audiogram horizontally into three ranges, and vertically into three degrees of loss. This gave a numerical pattern for each ear. Secondly, these patterns were grouped, according to frequency of occurrence and an arbitrary estimate of "seriousness", into eight categories. Thirdly, the categories for each ear of an individual person were grouped according to the frequency of occurrence and the amount of imbalance between the ears.

Stage I: The audiograms cover the frequency range 125 to 12,000 cycles. In view of the importance generally attached to the "speech range" each audiogram was divided into three sections, hereafter referred to as "ranges". These were:

Range (a) 125-999 cycles - "low range"
Range (b) 1,000-2,999 cycles - "speech range" or "middle range"
Range (c) 3,000-12,000 cycles - "high range"

Then the amount of loss recorded on the individual audiogram range was coded for each range for each ear separately. Within each range there is often a considerable variation of losses; for the sake of simplicity the coding was based on the greatest loss occurring in the range, regardless of the width of the frequency band over which the loss extended. This procedure might result in over-emphasis on island losses but seemed the best alternative as the readings were only recorded at rather wide intervals. The code numbers were assigned as follows:

Code 1	0-19 db loss - "No loss"
Code 2	20-39 db loss - "Moderate loss"
Code 3	40 or more db loss - "Severe loss"

Thus, the reading for each ear is represented by three numbers, i.e., 1, 2, or 3 for each of the three ranges. This gives a possibility of 27 different patterns.

Stage II: It was observed that some patterns occurred frequently and others not at all. It seemed that losses in the high range occurred most frequently and that these could occur with or without losses in the middle and low range. The next most frequent were losses in the middle range; these occurred with or without losses in the low range but almost invariably were accompanied by losses in the high range. Thirdly, losses occurred in the low range, and these if severe were always accompanied by losses in the higher ranges, whereas if they were moderate they were usually accompanied by losses in the higher ranges but not invariably. Thus of the 27 possible patterns, 10 did not occur in Groups 3-25 and the remaining 17 may be grouped into eight categories as shown in Table 6. Of these eight categories the first seven represent a progression of losses from no loss in any range to severe loss in all ranges; in the first seven categories the amount of loss is either constant throughout the ranges or becomes progressively worse toward the higher range. Thus the lowest range in which a loss occurs is used as the criterion for classification into categories. Category 8, a small group, includes all those ears where this progression of loss toward the higher range is not observed, and has been called "variable losses".

Stage III: Thus each ear was classified into one of eight categories, but frequently there was a difference between a trainee's two ears, and so there were again 64 possible combinations of the two ears. If, however, the ears were considered as "better" and "worse" rather than left and right then the number of combinations was reduced to 36. For this purpose only, the eight categories were assumed to be ranged in order of progressive loss. The distribution is shown in Table 7. These 36 combinations were again grouped according to frequency of occurrence in Groups 3-25 as shown in Table 8. The condition of the worse ear was considered in defining the groups, except where the difference between the two ears was very great and then separate groupings were made. Thus the final groups were as follows:

A. Both ears category 1, i.e., no loss throughout range.
B. Worse ear category 2, i.e., moderate loss in high range; no loss in middle or low range. Better ear category 1 or 2.
C. Worse ear category 3, i.e., severe loss in high range; no loss in middle or low range. Better ear category 1, 2, or 3.
D. Worse ear category 4, i.e., moderate loss in middle range, some loss in high range, no loss in low range. Better ear category 1, 2, or 3.
E. A wide grouping that includes worse ear of categories 5, 6, and 7, i.e., either no loss in low range but severe losses in the other two ranges (5) or losses throughout all ranges (6,7) excluding only the "variable" patterns previously described. Better ear categories 1, 2, or 3, i.e., a marked difference between the two ears.
F. Both ears category 4.
G. Worse ear category 5, 6, or 7. Better ear category 4.
H. Both ears categories 5, 6, or 7.
J. Those who have "variable" losses in one or both ears, i.e., loss in the middle range is accompanied by no loss in the high range or loss in the low range is accompanied by no loss in the middle range.

Thus we have nine groups, with some attempt at gradation between them insofar as category H is certainly worse than category A, but certainly no claim is made that they are correctly ranged in order of relative importance to the individual, as there seemed to be no way of estimating, for instance, whether a bad loss in one ear and good hearing in the other was a more serious handicap than a moderate loss in both ears. The best that can be claimed is a rough homogeneity within each group.

Differences between Samples

No audiograms were available for Group 2 or for one person in Group 14 and this reduces the total to 121 for Sample A. Audiograms were available for 74 trainees in Sample B, and to these nine trainees who entered Group 25 have been added. (After this classification was completed it was realized that Group 25 could not be included in Sample B for other purposes as they would not complete the program in time, but there is no reason to suppose that the inclusion of this group here will introduce any bias.)

The distributions of Sample A and Sample B between hearing categories A-J are shown in Table 9. There are no apparent differences between the two samples, the χ^2 value of 12.3 with 8 degrees of freedom having a probability of between 0.2 and 0.1.

Table 6. Hearing-Loss Categories for Single Ears

Category	Description of Loss	Loss Pattern			Number of Ears			
		a	b	c	Groups 3-16	Groups 17-25	Total	
1	No loss	1	1	1	90	46	136	
2	Moderate loss in high range, no loss in middle or low range	1	1	2	24	38	62	
3	Severe loss in high range, no loss in middle or low range	1	1	3	23	13	36	
4	Moderate loss in middle range, some loss in high, no loss in low	1	2	2	21	11	32	61
		1	2	3	16	13	29	
5	Severe loss in middle and high range, no loss in low	1	3	3	20	11	31	
6	Moderate loss in low range, some loss in middle and high	2	2	2	8	4	12	38
		2	2	3	6	7	13	
		2	3	3	8	5	13	
7	Severe loss in each range	3	3	3	14	9	23	
8	Variable losses	1	2	1	2	0	2	21
		1	3	2	0	1	1	
		2	1	1	4	5	9	
		2	1	2	2	0	2	
		2	1	3	2	2	4	
		2	2	1	2	0	2	
		3	3	1	0	1	1	
					242	166	408	

The combinations of losses that do not occur are 131, 231, 232, 311, 312, 313, 321, 322, 323, 332.

Table 7. Distribution of Hearing-Loss Categories for Both Ears

Better Ear	Worse Ear 1	2	3	4	5	6	7	8	Better Ear Total	Worse Ear Total	Grand Total
1	52	15	4	7	1	1	1	3	84	52	136
2		13	10	6		2	1	2	34	28	62
3			8	2		2	2		14	22	36
4				18	3	3	2	2	28	33	61
5					12	3			15	16	31
6						8	6	5	19	19	38
7							5	1	6	17	23
8								4	4	17	21
Total	52	28	22	33	16	19	17	17			408

Table 8. Grouping of Hearing-Loss Categories

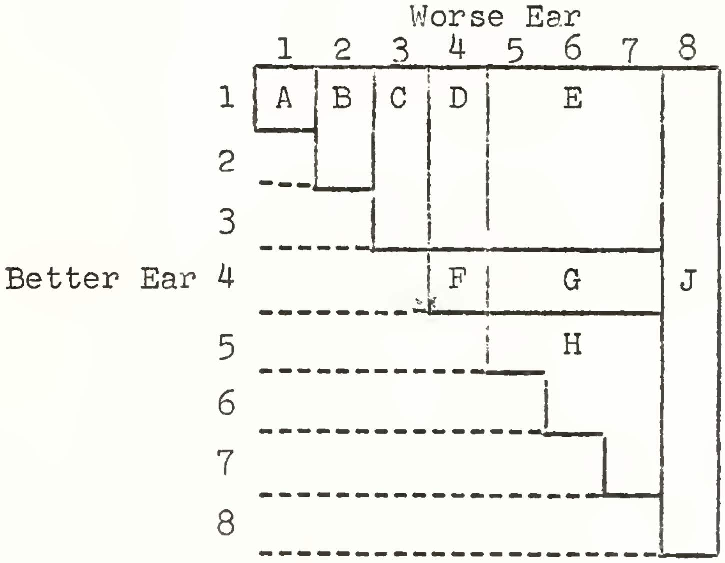

Table 9. Comparison of Hearing Acuity of 12-week Sample with 16-week Sample

Category	Number of Persons Sample A	Sample B	Total	% Distribution
A	36	16	52	25.49
B	11	17	28	13.73
C	13	9	22	10.78
D	10	5	15	7.35
E	4	6	10	4.90
F	11	7	18	8.82
G	3	5	8	3.92
H	24	10	34	16.67
J	9	8	17	8.33
Total	121	83	204	99.99

Table 10. I.Q. Distribution in the Two Samples

I.Q.	Sample A No. Persons	%	Sample B No. Persons	%
60-69	1	0.82	0	0
70-79	3	2.46	3	4.55
80-89	3	2.46	3	4.55
90-99	9	7.38	16	24.24
100-109	26	21.31	14	21.21
110-119	45	36.89	18	27.27
120-129	26	21.31	9	13.64
130-139	8	6.56	3	4.55
140-149	1	0.82	0	0
Total tested	122	100.01	66	100.01
No test	6		9	
Total	128		75	
Average I.Q.	113		107	

Other Handicaps

With narrative medical reports the best that can be done is to assume that what is not mentioned is not present. It was desired to obtain some estimate of how many trainees in each sample had physical limitations other than blindness. As it was known that all those blinded by diabetes have other manifestations of the disease they were considered as a separate group, regardless of whether they also had amputations, etc. The next group to be separated were all those who had restricted use of the hands or feet; this group includes all known cases of malformations, amputations, partial or total paralysis. The third category includes all those whose blindness was associated with brain damage. The fourth consists of trainees who had a history of mental disorder or disturbance, or of chronic alcoholism.

The remaining trainees were divided into three categories: those for whom no disease was mentioned; those whose blindness was one manifestation of a disease syndrome; and those who had one or more chronic diseases at the time of training. No attempt was made to subdivide the chronic diseases and probably some of them constituted a more severe handicap than others. They included: migraine, headaches; arthritis, dermatitis, neurofibrometosis; hay fever, bronchitis, chest pains; chronic constipation; obesity, arteriosclerosis, hypertension; dysphagia; gout, ulcer, gastric hemorrhage, pleurodynia, hepatosplenomegaly; metrorrhagia; hemorrhoids.

The distribution is shown in Table 11. It should be borne in mind that trainees falling into a particular category do not also belong in categories higher in the list but may have handicaps described lower in the list.

Table 11. Other Handicaps

	Sample A Groups 2-16	Sample B Groups 17-24	Both Samples
No disease mentioned	39	27	66
Diabetes	47	32	79
Amputations, fractures, or restricted use of limbs	11	2	13
Head injuries and brain damage	9	6	15
Mental disorder or deterioration, alcoholism	4	2	6
Blindness, one manifestation of disease syndrome	2	0	2
Other chronic disease present during program	16	6	22
Total	128	75	203

APPENDIX 2

COURSE CONTENT AND GRADING CRITERIA FOR SKILL COURSES

Mobility

During their stay at St. Paul's all trainees are taught to use the long Hoover cane. No trainee is considered to have completed the course successfully unless he has made a trip to downtown Boston alone by the end of the program.

As the ability to travel alone is a major objective a great deal of the instruction is directed to this end. In addition to classes actually called "mobility" which are held five days a week, the trainee spends many hours in ancillary courses designed to help him travel and move around more easily. Chief among these are fencing, "spatial orientation", "sensory training" and "kinesthetics". If "imagery stimulation" and the "art of visualizing" classes are also included, the total weekly class time spent by each trainee in this area is sixteen 40-minute periods, or 32% of the total instruction time. Even this is an underestimate if it is accepted that one of the most important contributions of the shop course is to overcome the fear of machinery and that this carries over to help in overcoming the fear of traffic.

Thus, when considering the most desirable length for a rehabilitation program it is necessary to look very closely at the trainee's progress in mobility.

Course Content

Although the rate of progress depends to some extent upon the individual trainee a brief summary of the content of the 16-week course gives some idea of the major aspects. When a 12-week course was given the same general plan was followed with condensation primarily in the later stages.

1st week. Classes start towards the end of the week as the first few days are given over to medical examinations and general orientation. The first classes consist of an explanation of the course and of the type of cane used.

2nd week. The trainee is shown the "cross-body" technique with the cane for use in the building and practices finding objects.

3rd week. More practice on "cross-body" technique and introduction of "walking" technique. The trainee is measured for the length of cane he requires and is given further drills indoors and in the driveway.

4th week. The trainee now has his own cane and is given repeated drills on the driveway to the exit gate and shown how to locate the position for crossing the street.

5th week. The trainee now starts traveling outside on the sidewalk and is given drills on locating the curb and crossing the street.

6th, 7th and 8th weeks. The trainee gradually learns to travel in the residential area near St. Paul's. At first he is oriented to a particular area on instructor's arm but progresses to the stage where he can travel in a new residential area alone after being given only a verbal description. During this period he is also shown how to negotiate stairs and how to get in and out of automobiles. By the end of this time he has learned how to cross a street at a traffic light. It is also during this period that the trainee, according to his individual progress, is normally given permission to travel alone in his free time if he so wishes. (Before he is considered sufficiently advanced to travel alone safely he is not permitted to leave St. Paul's without a sighted person as a guide.)

9th, 10th and 11th weeks. The trainee gradually moves from a residential area to a small shopping area for his practice. By the end of this period he should be able to locate a particular store in this area on his own, with the instructor following some distance behind him to watch him and discuss his technique with him afterwards.

12th, 13th and 14th weeks. The trainee is instructed in streetcar travel and introduced to crowded business areas. This includes such hazards as revolving doors and escalators, and a special cane technique for crowds.

15th and 16th weeks. By this time the trainee is able to travel alone and is sent alone on assignments to downtown locations. This final stage is considered so important that half-day trips are planned and other classes cancel~~l~~ed if they overlap the time planned for traveling.

Grading

Fortunately the same instructor has taught the mobility course since St. Paul's started until Group 24. Thus, comparisons of mobility grades may be made between groups without any obvious bias.

The grading is on the 0-4 scale used for all other "skill" subjects at St. Paul's. As would be expected, at the later stages of the trainee's progress more is expected of him than at the earlier stages, but the main aspects on which the grade is based may be summarized as follows:

Actual cane techniques such as the grip on the cane, correct position of the hand, width and evenness of the arc described by the tip of the cane, distance of the tip of the cane from the ground; the ability to detect obstacles and curbs with the cane; the use of correct technique in crossing the street, maintaining direction, and using sound clues adequately.

As the course advances the grade depends more on the trainee's ability to navigate the particular area prescribed. It takes into account his ability to relax and still travel safely, to apply skills learned in other classes, and to deal adequately with offers of assistance from the sighted public.

Fencing

The course was introduced in Group 3 and has always been taught by the same instructor. The trainees are divided into the same two groups of four and six as for braille and typing, for two practice classes each week and also have one period all together when theory is discussed.

Course Content

This course not only provides general physical exercise and an opportunity for strengthening and toning up little-used muscles but also develops many senses important to the blind person. These include ability to visualize as well as mental and physical agility. Development of neuromuscular skills, particularly touch, muscle-memory, balance, poise, posture and coordination, leads to better reflex action, recovery and "flash" recognition essential in mobility. Through the experience of working under pressure the aim is to improve the power of concentration and ability to relax in tense situations. The desired grip on the foil, firm but not tight, applies also to the cane, as does awareness of its position.

As fencing is a new experience to the trainees the course proceeds from introduction of basic positions and stance to competitive fencing between trainees.

The first five weeks deal with basic positions and fundamentals.

1st week. Introduction to course and objectives and basic "on guard" position emphasizing kinesthetic awareness of each part of the body and its relation to other parts.

2nd week. The "lunge" is taught, emphasis being placed on moving in a straight line, maintaining balance, awareness of length of stride, transfer of body weight and coordinated motion.

3rd week. The foil is introduced and the light grip essential for an acute sense of touch through the foil is stressed.

4th week. Foil positions are introduced and the trainee given exercises to make him aware of the position and angle of the blade.

5th week. Feeling with the foil is stressed, and the trainee taught how to tell from contact of the blades the position of his opponent's blade.

The second five weeks deal with interpretation of the relationship between two opponents' blades and translation in terms of offense and defense. Practice fencing with an opponent is introduced.

6th week. Slow fencing with the instructor.

7th week. Trainees fence in pairs for the first time, mostly only assuming positions on command from the instructor.

8th to 10th week. All footwork, handwork, offensive and defensive positions taught so far are integrated and trainees fence in pairs or with the instructor, thus learning to appreciate differences in their opponents by touch with the cane.

The last five weeks competitive fencing is introduced. Swift reaction is stressed and the trainee's thoughts influencing his actions are discussed.

11th week. The absence of the opponent's foil in a particular position as an indication for offensive motion is stressed.

12th week. "Out-thinking" an opponent is concentrated on.

13th week. More footwork is introduced including a jump forward and backward.

14th week. A fencing strip 3' x 20' is used to make trainees more aware of their location in the room and on the strip.

15-16 weeks. Team and individual competitions. Round Robin tournament.

Grading

The trainees are graded on their effort and achievement. Average and extreme final grades would reflect the following:

0 poor: Given to a trainee who showed no aptitude or desire to learn fencing.

(Note: Any trainee who shows effort will receive a grade of 1, regardless of his level of achievement.)

2 average: Has a fairly good grasp of fundamentals but does not always execute movements properly, tends to limit himself to certain motions rather than utilizing all motions, does not always adapt himself to new competitive situations.

4 superior: Uses all basic motions correctly, and correct thought process and analysis when fencing. Such a trainee would be able to defeat a sighted person with similar training if the sighted person were blindfolded (as would some of the trainees receiving a grade of 3).

Orientation and Visualization

Orientation and visualization are regarded on the timetable as two different subjects. Each week every trainee participates in a group class in each subject and each pair of trainees have two periods of instruction on their own in visualization. In practice it is more difficult to separate the two as they are taught by the same instructor, who has been with St. Paul's since the Center opened. Since Group 7 the two have been regarded as separate subjects and grades required for each, but the procedure seems to be that the two group periods are lecture periods (for which no grades are given) and the two individual periods are practice periods; for each practice period a trainee is graded separately on his orientation and visualization abilities as evidenced by his performance on the same exercise. As many of the exercises are necessarily performed outdoors they are not given in the same order for each group, but an approximate order is followed according to weather conditions. Thus, it is only possible to give a list of some of the topics included in these exercises. A summary of the content of the lectures is appended.

Course Content - (A) Exercises

General Orientation to the Building. The trainee is first shown a scale model of the floor plan of St. Paul's and then locates the actual rooms, stairways, etc.

Walking Geometric Shapes. The trainee is asked first to walk a straight line and then simple shapes such as squares and circles, then proceeds to more difficult shapes. He first does this in an unobstructed space both clockwise and counterclockwise and errors are corrected. Then he repeats with the addition of human and inanimate objects which must be circumvented.

Orientation to the Grounds. This proceeds from orientation along the paths to routes across the gardens where hazards are encountered. At first these are guided; then the trainee is led to a particular point and expected to locate himself. He is also given exercises in locating objects on the grounds.

Orientation to Large Hockey Field. Here the trainee is shown techniques for obtaining his bearings in an open unobstructed space and is given practice in putting them into effect after deliberate confusion.

Passive Turning Exercises. First the "sense of turn" is demonstrated by isolating it from other senses. Then its usefulness is eliminated by confusion and the trainee is expected to orient himself through his remaining senses.

A rotating typing chair on castors is used for this exercise and throughout the trainee is turned without any ground contact, thus eliminating this aspect of kinesthetic awareness. In the first exercises he is turned in small arcs and then asked to judge how far he has been turned and to visualize what is in front of him.

In the second set of exercises he is turned until disoriented and taught to reorient himself by the use of tactual and auditory cues. Finally he is both turned and moved in confusing manner to another part of the room and again has to orient himself by the use of the other senses.

The Use of Sound Reflection (Type C). In his book Father Carroll has defined three types of sound reflection that are useful to the blind person. These are:

A. The usual "echo" when both original sound and reflected sound are heard separately.

B. A similar phenomenon but the reflecting object is so close that the observed effect is a modification of the original sound rather than two distinct sounds.

C. The so-called "facial vision" where the reflected sound is perceived through the ears but recognized as more generalized skin sensation rather than as sound.

This exercise is to demonstrate (C) "facial vision" to the trainee and give him practice in using it. The idea is introduced by holding a piece of cardboard a few inches from one ear and repeating this until the trainee is able to tell the position of the cardboard. This is followed by exercises along the corridor with some doors open and some shut. Finally there are exercises in open rooms and out-of-doors.

Orientation to Newton Centre. The trainee first draws under instruction a map on the blackboard. Then he is driven around the area in order to gain an idea of spatial relationships; then he learns a more detailed map and locates specific buildings on foot. Finally he enters a store and locates particular items in the store.

Orientation to the Charles River Area. Similar methods are followed in orienting the trainee to the more open areas near the Charles River. Included here are trips to the river bank, the boat landing, the bridge and the Founder's Monument and coordination with the adjacent roads, policemen's kiosk and traffic stand.

Thus, the exercises start in one room and then proceed to the enclosed grounds, residential districts, shopping areas and then open country. Throughout the course the use of all the senses is demanded (methods of use being explained in the lectures) and in particular the trainee is frequently asked to describe what lies before him in an attempt to encourage him to visualize. The aim is not to teach trainees how to move about in the particular places in which the exercise is performed but to teach the most efficient ways of using the remaining senses in a variety of situations. The prime intent is to set up new coordinations in which the mind's eye is automatically alerted and informed by the remaining senses and responds accurately to this sensory intake as it did originally to visual stimuli.

(B) Lectures. No detailed notes of each lecture are available but the general content of the two subjects is summarized as follows:

(a) Visualization

The meaning of the term is defined and its use explained. This includes explanation of the clues that can be obtained from different senses and techniques of using the art of visualizing. Individual sessions are devoted to visualizing through hearing, through touch, through external kinesthesis, through smell and taste, through the internal senses - sense of turn and kinesthetic sense - and through words. With regard to this latter an additional session is spent on techniques of questioning, the objective being to assist the trainee to ask questions of a sighted person in a manner that will evoke the most pertinent and necessary information for forming an accurate picture in the mind's eye. Other sessions are given over to stimulating visualization through various arts - sculpture and form in all objects, music and poetry.

(b) Orientation

These lectures consist of discussion and demonstration of the uses of the remaining senses. They deal with each sense organ, its function, possibilities and limitations. This listing and analysis are intended to aid the trainee to concentrate on improving his use of individual senses one by one and in combinations for cross-checking until he attains a level of automatically integrated response. His experiences and problems in orientation encountered during the program are discussed and suggestions made.

Some time is also spent on implementation; this includes discussion of the relative merits and uses of the cane, guide dog and human guide as well as instruments currently being developed that may be of value in the future.

Grading

It is difficult to obtain a very clear definition of the level of performance corresponding with each grade, but a description of the extremes and of the usual level of performance gives an idea of the proficiency expected.

(a) Visualization

0 poor - No evident response.

2 average - Tends to use the remaining senses only in the manner they are used by a sighted person rather than to superimpose the additional functioning needed in the absence of sight.

4 superior - Performs as if he were in fact seeing; body, hands and head movements are "seeing" movements: he looks directly at the person addressed rather than turn an ear towards him, touches objects surely and naturally without fumbling, moves directly to his objective rather than from landmark to landmark, etc.

(b) Orientation

The orientation grade is based on the trainee's ability to readily reach his objective, regardless of how this is done. The extremes and average performance are as follows:

0 poor - Goes in wrong direction even with physical contact with landmarks or pronounced auditory cues.

2 average - Tends to rely on "internal" senses, turn and kinesthesis, without checking these continuously through the use of the "external" senses.

4 superior - Knows at any moment where he is and in what direction he is facing or moving in relation to a relatively accurate and detailed mental map of his environment. He uses the sensory intake from external and internal senses in a well coordinated manner and in the event the intake from remaining senses is insufficient at any moment in a new environment he does not strain the limitations of any sense use, but works cautiously within these limitations until sufficient information has been obtained with which to proceed.

Sensory Training

This course was introduced in Group 18 and in the following group the instructor changed. The following summary gives the content of the course as taught by the instructor of Groups 19-24.

Course Content

The course consists of four main aspects devoted to (1) sound, (2) touch, (3) kinesthesis, (4) awareness of sensory clues including taste and smell.

1st week. Explanation of course and orientation inside the building, stressing different sounds.

2nd week. Identification and location of sounds inside building following an explanatory taped lecture. Exercises are given on locating a ticking clock at various distances, with and without other distracting sounds, muffled and unmuffled, etc.

3rd week. Trainees are oriented to clothesline and exit driveway, stress being placed on sound cues, both outside traffic, etc. and sounds coming from inside the building.

4th week. Trainees are oriented to the entrance driveway, the main emphasis again being placed on sounds and trainees are also instructed on tactile cues which they can pick up with their canes.

5th week. Trainees leave the driveway and travel across the grounds parallel to the sound of the traffic. Again they use touch to identify objects encountered.

6th week. This week the trainees work around the hedges and parking lot where they encounter more obstacles.

All these lessons are accompanied by explanatory talks on different uses of sound, including facial vision. Trainees are also constantly asked to identify the sounds they hear and locate them. During these weeks exercises are also given indoors (according to the weather) on sound identification of dropped objects. Or further outdoor exercises may be given such as negotiating an "obstacle course" of chairs and stools set up in the driveway.

7th week. A tape recording of a lecture on touch is given, explaining the different uses. The trainees also explore the outside of the building, using canes to locate windows, fire excapes, and stairwells, and then being asked to describe their position relative to rooms inside the building.

8th week. Stereognosis is further explained and exercises given. Trainees explore the bust of Homer, complete jigsaw puzzles, identify plastic animals, etc.

9th week. The Mitchell Kit (a collection of one, two and three-dimensional related basic shapes) is used to give further exercises in recognition through touch and muscle-memory.

10th week. Drills are performed on judging weights; in this case various utensils are filled with water until their weights "match". A tray of water is also used as a device to teach trainees how to skin over an object lightly with their hands. A lecture is given on kinesthesis.

11th week. Kinesthetic drills are given in hall and lobby; these include turning and walking in a straight line, walking backwards, etc.

12th week. Trainees are shown the best way to unobtrusively "braille" a chair prior to sitting in it (i.e., locating the seat with the calf of the leg to protect the shin, ascertaining that the chair is empty, etc.). Trainees are shown how to find the doorhandle of a car and the best methods for getting into two-door and four-door cars, including bringing in a long cane. A lecture is given on taste and smell mentioning uses and disadvantages of these senses.

13th-16th week. By this time the trainees are making trips to restaurants and shopping areas and using the subway. They also have a luncheon at the instructor's home (See T.D.L., Principles). The class periods are largely devoted to discussions of how much the trainees observed on these trips and on their luncheon experience. Their sensory awareness is encouraged by asking questions about sounds, smells, weather overheard conversation and particularly visualization of the places they visited. A tape recording of Boston subway is used for further practice in sound discrimination and identification.

Grading

The weekly grades in this course are based on a combination of the amount of interest shown in the particular lesson and the ability to achieve the objective of the lesson. As the lesson plans show, the emphasis is on practical use of the particular senses rather than on developing fine discrimination abilities. Thus physical loss of function would have a varying influence on the grade given depending on the particular loss. The first-part of the course deals largely with the use of hearing and a person with a severe hearing loss would of course not be able to excel in these lessons and consequently could not achieve a final grade of 4. Smell and taste, however, are only considered in one class period and as this is largely a discussion of the uses of these senses a trainee with a recent loss would be able to participate from past experience. The exercises involving touch are concerned mostly with gross usage for purposes of recognition and the trainee who lacked the discriminatory ability needed for braille would probably not be handicapped as regards grosser usage of the sense of touch. Thus extremes and average grades are awarded on the following basis:

0 lack of effort, totally ineffective performance, pays no attention to instructor.

2 average: Effort and attitude satisfactory but no great enthusiasm or interest shown.

4 superior: A combination of good attitude and performance. Follows directions well, understands objectives of the course and performs well, integrating techniques taught in other courses. Shows a general awareness and willingness to comment on objectives of the course. Disagreement is considered as valuable as agreement in that it reflects thought and interest in the subject.

Imagery Stimulation

This course was introduced in Group 5; between Groups 17 and 19 there were three changes of instructor. Since Group 19 it has been taught by the same instructor and the following course outline is based on his lesson plans. Although no records are available, it is believed that there was quite a considerable change of content.

Course Content

1st week. The aims and objectives of the course are explained, emphasis being placed on the fact that the main purpose is to stimulate the controlled imagination through the use of various skills, tools and techniques and that artistic ability is not a prime requirement. Then each trainee is asked to give a verbal "self-portrait".

2nd week. Imagery game. One trainee leaves the room and while he is absent the others choose a well-known person. On his return he tries to identify the person by requesting analogies, i.e., "What sort of a tree is he?", "What sort of a flower?", etc.

3rd week. Drawing drills. Trainees are given specific instructions on drawing a simple shape of a given size. Then they complete a picture incorporating this shape, i.e., having drawn a circle of a certain size they then draw other objects basically circular in shape. They are also given instructions line by line on drawing a simple object, then asked to identify what they have drawn. The purpose of these drills is to determine their ability to follow instructions, to arrange their drawing within the confines of a page, and to maintain the concept of relative size when drawing as well as showing their creativity and manipulative skill.

4th week. Each trainee makes a drawing with "Mortite" (putty-like window stripping). He chooses a subject with which he is familiar and draws it, then the raised line drawings are passed around the class and other members identify what has been drawn.

5th week. Matchstick figures representing some kind of sport or physical activity are constructed from pipe cleaners. These figures must represent "action" lines. On completion they are again passed around to the rest of the class for inspection.

6th week. Using Mortite, pencil, and cardboard trainees draw a map of the grounds, incorporating as much information as possible. This lesson is apt to show up surprising misconceptions about the spatial relationships, shape of the driveway, etc.

7th week. Work with clay is introduced, by modeling simple basic shapes.

8th week. Work with clay is continued, each trainee modeling a simple object.

9th-12th weeks. Each trainee models a clay project (head, figure or animals, etc.) and when these are completed they are examined by the rest of the class and a display arranged for Family Seminar.

13th week. Each trainee recalls a memorable scene in his life and describes it to the rest of the class. The others then ask questions so that they may enlarge or more accurately visualize the described scene.

14th week. A special 15-minute tape is played; it is a narrative that unfolds characters, setting and situation but gives no descriptions of color or detail, although subtle hints are given. Then each trainee is asked to describe the appearance of the characters, house, dog, car, etc. as he visualized them and the rest of the class point out any inconsistencies.

Very often the last two weeks no class is held as trainees are on mobility trips. If it is held, trainees may color the simple objects they made in clay, or they may have more practice in verbal description, i.e., they may be asked to weave a story around key descriptive words supplied by the group.

Grading

Grades in this course are based on both attitude and performance. Performance is measured not only by the objects produced but also by verbal descriptions.

0 poor - Effort and attitude unsatisfactory, pays no attention to instructions.

2 average - Effort and attitude satisfactory but no great enthusiasm. Performance only moderately good.

4 superior - Superior in both attitude and performance. Shows creative ability, flair, manual dexterity and imagination in execution in clay, mortite and other mediums. Spontaneous verbal response and ability to form an integrated mental picture and describe it adequately.

Kinesthetics

Originally in Group 6 a course called "Sensory Training" was introduced. This was taught by an instructor of modern dance. Later it was realized that the name of the course was not appropriate and it was changed to Kinesthetics. Grading was started in Group 11. This continued until Group 19 when a new instructor with different background took over the course. A further change of instructors occurred in Group 20. This instructor decided to take the trainees two at a time rather than all ten at once.

With the change of instructors the course content changed considerably and is in fact still in a somewhat fluid state. At present specific kinesthetic exercises are given until about the 10th week; after this time the trainees are combined in larger groups and the exercises are based on the instruction in both kinesthetics and the "spoken communication" course which is taught by the same instructor.

Course Content

1st week. Explanation of meaning and purpose of course, including definition of "muscle memory", of practical problems that can be solved by kinesthetics and of the relationship between kinesthetics and mobility.

2nd week. Cane drill to accompaniment of metronome, with emphasis on shifting balance and coordinating movements of cane and feet. Walking with book balanced on head to improve balance and posture.

3rd week. Instruction on how to deal with collisions between people or inanimate objects. Practice in turning specified angles, approaching and sitting in chairs, isolated and at table.

4th week. Walking patterns, both assigned patterns and patterns first described by the trainee by "writing in the air" or on the blackboard. Emphasis is on the difference between a stationary turn, walking sideways and changing direction while walking without turning the body.

5th week. This deals with judgment of distance. Exercises are given both inside and outside in judging width of openings, distance from wall, etc.

6th and 7th weeks. Drills on posture, emphasis being given to holding head erect and maintaining balance and a relaxed stance.

7th week. Further exercises on posture and exercises to develop sensitivity of the feet to different floor coverings.

8th week. Walking drills to develop balance and other kinesthetic drills.

The second half of the course is devoted to further drills designed to improve balance and posture as well as kinesthetic awareness. These include weight-lifting (to enhance the kinesthetic appreciation of differences in weight) and rope skipping. From time to time, according to the season of the year and other factors, a visit to the local bowling alley, a lesson in folk dancing or other movements in groups may be included. Towards the end of the course the emphasis is increasingly on practical applications and the trainees are taken to banks, stores and supermarkets where they buy clothes or perform other transactions which they frequently had given up with the onset of blindness. The debates and other exercises where both oral communication and kinesthetic awareness are involved are described under spoken communication although for the last six weeks the allocation of class periods between these two courses depends on the weather, the availability of free classrooms and similar practical considerations.

Grading

As can be judged from the preceding section the course has many different aspects and a grade is given each week based on the performance and effort put into the week's exercises. Thus the final grade, which is an average of the weekly grades, includes all these various aspects.

0 poor - A trainee with this grade would usually have a severe handicap (i.e., disease or injury affecting his sense of balance) which would make it impossible for him to do many of the exercises. (Note: For some types of handicap different exercises are assigned for the individual and his grade is based on how well he performs these. Thus latterly very few "0" grades have been given.)

2 average - No obvious balance difficulties or inability to perform the simple exercises assigned.

4 superior - Movements and posture resemble those of a sighted athletic person: well-coordinated easy movements, relaxed but erect posture.

Typing

This course is taught to trainees in groups of four and six; each group has five periods a week of instruction and trainees are also expected to practice in their free time. There was one change of instructors in Group 17 and the following outline of the course describes briefly the plan followed by the present instructor. Trainees have varying knowledge of typing on arrival at St. Paul's; the plan described is for those who have no prior knowledge. Sometimes a trainee has lost the use of one arm and for these trainees a special method of touch typing with one hand is taught. (This is even possible if the trainee also has a missing finger on the available hand.)

Those trainees who already have some knowledge of typing and wish to learn to use the audiograph are also taught this skill in the typing class.

Course Content

1st week. A description of the room and explanation of the course precedes instruction in posture at the typewriter and position of the "home" keys.

Trainees practice insertion of paper, use of carriage release lever, tossing the carriage, and use of shift key for capitalization as well as drills on the home keys.

2nd week. The trainee reviews the previous week's lessons and learns new letters and punctuation marks. He is also taught to use the paper guide, to compute margins and set margin stops and to double space with the carriage where appropriate.

3rd week. By the end of the third week the trainee has learned the alphabet on the keyboard. Each day some time is devoted to review and some to the introduction of new material. Trainees type from dictation by the instructor, progressing from single letters, to words, to sentences. This week the correct layout for a personal letter is also introduced.

4th week. Largely review and practice, emphasizing different aspects of technique each day such as accuracy, position and curve of fingers, posture, returning the little finger to the home position after using the shift key, etc.

5th week. Sentences containing the alphabet are dictated to improve accuracy. The new material taught includes tabulating, double and triple spacing, and margin release. The trainees also have their first one-minute timed accuracy test.

6th week. By the end of this week the trainees have been taught all the numerals and meanwhile have been developing speed and accuracy by means of appropriate drills and timed tests. As these latter are now included each week only new material is mentioned below.

7th week. Trainees are taught how to center names and titles using the backspacer. They also learn how to lay out a personal business letter in semi-block style; to do this they must memorize the appropriate number of spaces and lines to leave for a letter of given length.

8th week. New material introduced consists of the assorted symbols on the shift key of the numerals and punctuation marks.

9th week. By the end of this week trainees have been taught all symbols on the keyboard. They practice setting up a personal business letter and learn how to sign the letter while the paper is still in the machine. They are taught how to set up the typewriter for different size envelopes and different type sets.

10th week. Trainees are taught the full-block style for personal business letters and they compose their own letters and type them in both styles; they also type envelopes and fold and insert the letters. They are taught the names of the parts of the typewriter.

11th week. Trainees type menus for Family Seminar week end and learn how to set up a personal note. They type names and addresses of fellow trainees for their own personal use.

12th-16th weeks. From this point on the main emphasis is on practice and review to develop accuracy and speed. Tests and drills are given, and practice in typing different kinds of letters, using carbon paper, letterhead paper, post cards, etc. Trainees who so wish are taught special aspects such as setting up footnotes, "How to Type an Outline", and "How to Type a Manuscript", etc. All trainees are given the opportunity to become familiar with different model typewriters.

Grading

The trainees in this course are graded on their accuracy and intelligent approach to problems such as setting up letters and envelopes. They have timed tests almost every week, and in these accuracy is stressed. The tests may be one-minute tests or a series of fifteen-second tests. On occasion they are also asked to type a sentence for two minutes. Longer tests are not given because of the difficulty of dictating to a group of trainees typing at different speeds. The grade is based entirely on typing performance and not on spelling ability.

Thus the extreme and average performances would be as follows:

0 poor - Cannot find correct keys at all.

2 average - Knows keyboard, and can type under instruction but cannot always remember the correct setup and is apt to make typing errors.

4 superior - Types accurately and fluently at a minimum speed of 30 words/minute. Work is also well set up on the page.

Handwriting

A course in handwriting has been held at St. Paul's since it started. All trainees attend together for one period a week. This course is usually taught by the typewriting instructor, but there have been several changes of instructors. The present instructor has taught since Group 18 and the following outline is based on her lesson plans.

All trainees who come to St. Paul's know how to write, but many with the onset of blindness cease to do so. Unless this art is maintained a blind person loses the ability and is even unable to sign his own name. This course introduces techniques to enable trainees to continue to write, or relearn to write if their handwriting has already deteriorated.

Course Content

1st week. The Marks Script-Writing Guide is introduced. Trainees insert paper and start to practice writing. They are asked to write the names of the members of the staff as this helps them in pronunciation of the names.

2nd-3rd weeks. Letters of the alphabet are written using the guide and emphasis is placed on the proportions of the letters. Words are written and the trainees are instructed to write in the middle of the slot to leave room for up and down strokes.

4th week. Trainees following instruction set up a personal business letter on the guide. They also learn how to insert an envelope and center the address.

After the fifth week the trainees continue to use the guide each week and write both dictated passages and their own compositions on assigned topics. The dictated passages are chosen to introduce varied punctuation marks and help the trainees visualize these when they are typing them. The assigned topics generally relate to other courses at St. Paul's and include the following:

Directions to a blind person to find his way to your house.

The four ways of using hearing with examples of each.

Techniques in the use of the cane and relationship to the foil in fencing.

Description of Newton Corner.

How sense of touch is used in courses at St. Paul's.

A personal letter of invitation to the Family Seminar, saying why attendance is important.

Evaluation of courses at St. Paul's and description of most beneficial subjects.

Experiences of eating out in a restaurant, visiting toastmaster club, etc.

Towards the end of the course the check-writing guide and two types of signature guides are introduced and the trainees practice using them. They also spend one period using raised line stationery as an alternative to the Marks guide.

Grading

In grading the writing no attention is paid to spelling or content. Nor is any attempt made to change the style of writing, i.e., a person who has always used block letters rather than cursive continues to do so. Thus the extremes and average performance would be as follows:

0 poor - Handwriting not legible. (This seldom occurs.)

2 average - Handwriting is not always legible and trainee has difficulty using the guides.

4 superior - Handwriting is neat and legible and he is able to use all the guides successfully.

Shop Work

This really consists of two courses, individual shop instruction taught to two trainees at a time five days a week, known as "shop", and group instruction taught to each group of four or six trainees once a week, known as "Shop Group". The two are taught by the same instructor. The instructor who started with Group 1 continued until Group 23 when there was a change of instructors. Consequently, the course content presented below applies only to Group 23 and subsequent groups. The two aspects of the course are described separately below as their objectives differ. Common to both aspects are safety techniques; emphasis is placed on such matters as carry sharp tools or long pieces of lumber safely, removing plugs and turning off the main switch of power machinery when setting up the tool, etc. When repetitive work has to be done on a machine (as in "mass production") jigs are made and fastened over the work area of the tool.

Another feature common to both courses is that trainees are taught to locate all tools themselves and return them to their correct position.

Course Content

(A) Shop

In the shop course the aim is to give the trainee as much varied experience as possible and to overcome his fear of moving machinery by assisting him to be aware of the information he can obtain from both differences in sound and different aspects of touch, including vibration. At the same time interest is maintained and a sense of accomplishment is achieved as the trainees complete individual projects. These are always entirely their own creation; no ready-made designs are used and at each stage the trainee is encouraged to solve problems that arise by himself. Methods have been devised whereby blind trainees can operate the power tools safely and effectively. Details of these methods have been recorded in the day-by-day lesson plans, but they are not included here.[1]

The content of the individual shop course where two trainees are taught at a time is as follows:

1st week. Orientation to layout of shop, including the location of the fire escape and of power and hand tools. (Note: different floor surfaces (i.e., sandpaper paths) are used to assist trainees in avoiding collisions with machinery.) The purpose of the course is explained and safety techniques discussed.

2nd week. The use of braille rules is explained to all and practice given in marking out lengths of wood and scribing lines. The three aspects of the course are explained. These are:

(1) Personal, an individual project is to be made.
(2) St. Paul's, minor repairs and needed additions are made.
(3) Shop, adjustment and minor repairs of machinery are done.

These last two provide a different type of experience from the first.

3rd week. Trainees start to use hand tools; they practice hammering and fastening with both nails and screws, also sawing by hand using the cross-cut saw, rip-saw and coping saw on wood and the hack saw for metal.

4th week. More difficult hand tools are used; the trainees bore holes, using the bit-stock and the hand drill. They are instructed in the use of the compass and practice finding dead centers and laying out and center-punching a series of holes; this latter gives further exercise in the use of the braille rule.

5th week. Trainees practice filing both wood and metal, and sanding by hand. They use a marking gauge and hand-plane wood with both block and smoothing planes. They also use hand chisels.

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[1] The publication of this material would, of course, be of great interest to other centers and is envisaged.

6th-10 weeks. After the fifth week each trainee plans his individual project. First he draws it with a pencil creating his own design and writes a description. Then he lists the materials required, down to the hardware and finish, and gives the list to the instructor who approves and obtains the items. Throughout the course, emphasis is placed on developing the trainees' creative ability rather than in giving trainess specific instructions; they are encouraged to work on their projects on their own in the evenings. During the following five weeks the project is measured, laid out and cut and individual pieces finished.

From the 5th to 10th week trainees are also familiarized with work on the power tools, each hand operation being paralleled on the machinery as follows:

Hand Tool	Machinery
Cross-cut and rip saw	Circular saw
Coping saw	Jigsaw and bandsaw
Hack saw	(Automatic hack saw methods not yet developed)
Hand drill and bit stock	Drill press and electric hand drill
Hand sanding	Automatic belt and disc sanding
Hand planes	Jointer
Hand chisels	Shaper
	Use of lathe for making cane tips

Often the trainee who has tool experience in sighted life can readily teach another trainee who is unfamiliar with tools. After instruction the trainees use the tools needed for their own project, but care is taken to ensure that every trainee has experience with the setup, adjustment and use of each piece of machinery.

11th-15th weeks. Trainees assemble the already-finished parts of their projects and are taught how to stain and paint them. The trainee usually chooses to make a main project from wood; he is also required to make something in metal, usually a smaller item. Both these the trainee is able to take home with him when he leaves. He also makes at least ten cane tips on the lathe to take home.

Each group is taught according to the ability of the group, as regards experience, initiative, interest and creativity. Within a group, however, each individual progresses at his own rate, so that the number and complexity of projects completed will vary according to the individual. Some items that have been completed by trainees recently are:

- Table and wall lamps
- Picture frames
- Modernistic desks
- Picnic tables
- Toy chests
- Serving trays
- Record cabinets
- Jewelry boxes
- Miniature furniture such as bureaus and dressers
- Window boxes
- Small occasional tables
- Poker tables, etc.

In addition to these individual items, trainees may also repair a stool, replace shingling or make other needed repairs at St. Paul's, or make racks, stands, or shutters needed in various places and fasten them in place. This is the type of repair that they may need to do in their own homes.

(B) Shop Group

The aim of this course is to encourage the trainees to work together in a small group with a common objective; the emphasis is on teamwork and usually the project is produced on a small-production basis similar to that found in industry. The group solves problems that arise together but unlike other courses at St. Paul's discussion is limited and manual work stimulated. Usualy the group project chosen is one that can be finished readily so that interest is not lost. This course starts in the second week and an idea of the stages is given below, but this will of course vary according to the project.

2nd week. Discussion of the purpose of Shop Group and of the project for the group. The project varies; recent examples are the manufacture of ash trays for one of the two groups and clothes dryers for the other. In the following outline the steps for the latter are described.

3rd week. Power machinery is introduced by the instructor starting each machine, placing work in it, then stopping it. The differences in sound between machines, between sharpness and dullness of the tool, between hard and soft wood, etc. are pointed out. Each trainee is asked to gauge the stopping time of each machine and is shown the position of "on" and "off" switches. Safety rules are discussed.

4th-5th weeks. Sketches are made for the group project, and patterns made as required. Jigs are made or, if already available, work is started.

6th week. By now parts are being produced; if a particular setup takes two people the trainees rotate so that each person in the group has a chance to run the particular machine. The group is expected to solve any problems that arise; even if an incorrect decision is made, they are allowed to proceed and discover their own mistakes.

7th-8th weeks. The concept in the mind of the trainees initially and the concept by the seventh week varies. By this time the parts are made and handled and they are better able to visualize the completed project. Sometimes a finished sample is made by the more experienced trainees (usually the men have more experience than the women) and the others are thus helped to realize how assembly is to be carried out. Finishing parts and sanding are performed.

9th or 10th weeks. Staining and varnishing are completed and the parts assembled. Certain trainees are more skillful at one phase than others and they tend to assume responsibility for this phase with assistance from the others.

11th-16th weeks. Assuming that the project of one group is completed they then take over the project of the other group. Deliberate over-production of parts permits this interchange which enables trainees to have experience of both types of production. The items produced are always such that the trainees themselves or St. Paul's can utilize them.

Grading

Unfortunately the basis on which the instructor who taught Groups 1-22 graded this course is not available.

The current instructor who started in Group 23, faced by a great deal of enthusiasm on the part of the trainees (most of them unasked spent much of their free time doing shop work), has only given "above average" or "superior" grades. It is believed that he is now aware that this may give the false impression that trainees excel in this area more than in any other skill course and is revising his grading criteria.

Housekeeping

Course Content

The housekeeping course is taught on an individual basis, two trainees at a time being given a lesson. Both men and women take this course which is aimed primarily at developing techniques which will enable a trainee to cook simple meals, keep the place clean and care for their personal laundry. Simple sewing tasks are taught to both men and women, and further instruction in sewing is given to the women only.

Most of the tasks require repetition before the trainee can fully master the technique. Thus the general plan is to introduce one or two new aspects each week and spend the remainder of the week in practicing techniques taught in previous lessons. The rate at which new items are introduced depends on the progress of individual trainees. Thus lesson plans are somewhat flexible regarding the week of occurrence and it makes more sense to consider the general scope of the course under the main headings of food preparation, cleaning and orderliness, laundry and sewing.

This instruction helps the trainees to overcome their fear of the stove and of hot foods and liquids. Not only are specific techniques taught but advice is given on purchasing, storage and all aspects of housekeeping in relation to the handicaps of blindness; for instance, the purchase of the best grade of potatoes is advisable as they are cleaner and there will be less waste.

Food Preparation

The trainees begin by making coffee, then proceed to making cakes from mixes to making cookies, bread, and cakes without mixes that require icing. They learn to cook eggs and bacon, to prepare simple meals and by the week of the "Family Seminar" (the 12th week in the 16-week program) they are able to prepare and serve lunches for the visitors. This involves peeling and cooking potatoes, making sandwiches, arranging food attractively, etc. During this course they thus learn first to use the top of the stove and then proceed to using the oven. They also become familiar with the braille timer, braille electric frying pan, etc.

Orderliness and Cleanliness

The trainees proceed from simple housekeeping tasks such as lining a tray with foil to cleaning out cabinets and climbing a step ladder to wash the windows. All these seemingly simple household chores involve new techniques for a blind person; even in washing the floor they must learn to divide off a portion of the room and proceed systematically so as not to miss a patch. They learn how to make and use plastic braille labels to identify packaged goods and for labeling the cupboard doors; as the course progresses they may be expected to locate the articles they need. They are shown techniques for bed-making and are expected to make their own beds each day.

Laundry

While at St. Paul's the trainees are expected to take care of their personal laundry. Early in the course they are instructed in the use of the washing machine and given ironing lessons. Some of the male trainees prefer to send their laundry home to their wives, but this does not excuse them from learning how to iron a shirt or the ruffles on the kitchen curtains.

Sewing

Both men and women are instructed in the use of a needle threader and perform tasks such as sewing on buttons. The women are given further instruction in pinning, basting and stitching by machine (a simple guard renders this less of a hazard). They are given the opportunity to make any article they wish or to make alterations to their clothes.

Grading

The same instructor has taught this course since St. Paul's

began. The trainee's grade is based on the efficiency with which he performs a given task and how little assistance he requires. Thus a trainee who could only proceed from step to step with explicit instructions at each stage would obtain a grade of 1; a trainee who was able to complete a given task correctly with only brief instructions initially would receive a grade of 4.

Techniques of Daily Living

This has always been divided into two different classes, "Principles" where problems are discussed and advice given and "Drills" where the trainees practice specific techniques. Sometimes both classes have been taught by the same instructor, sometimes by different instructors. It seems to be generally thought that the "Principles" are best understood and therefore taught by a blind instructor, whereas assistance with techniques can best be given by a sighted instructor.

The "Principles" has been taught to the whole group of trainees at the same time, the techniques to two trainees at a time. Thus each trainee has one period of instruction per week in each course.

Course Content

(A) Principles

The following list of topics gives an idea of the contents of the "Principles" lectures; these are not didactic but aimed more at general discussion of possibilities in the hope that the trainee will then select the best method for him. These notes were prepared by the instructor who taught the course since Group 19. Information is not available on the content of the course prior to that date, but probably included the same general topics.

1st week. Introduction and explanation of course.

a. Discussion of the importance of identifying money.
b. Discussion of braille watches.
c. Discussion of the importance of dialing phones.
d. Methods of lighting a cigarette.

2nd week. Introduction to pouring cold liquids.

a. Various types of cold beverages.
b. Varying consistencies of beverages.
c. The various problems involved.

3rd week.

a, b and c. Same as above for hot liquids.
d. Discussion of personal fears of scalding

4th week. Listen to record "At Table" followed by a brief discussion. (Talking book by Julliet Bindt)

5th week. Introduction to mealtime eating techniques.

a. Face of the clock techniques.
b. Food cutting.
c. Pushers.
d. Problem foods.

6th week. Etiquette.

a. Table settings.
b. Passing of food.
c. Importance of sounds.
d. Importance of good table manners.

7th week. Identification of clothing.

a. General discussion.
b. Various methods of wardrobe organization.
c. The importance of coordination.
d. The care of wardrobe (cleaning, brushing, shining, etc.).

8th week. Appearance.

a. Correct clothes.
b. Sloppy vs. casual.
c. Importance of first impressions.
d. Importance of good carriage and manner.

9th week. Dependency vs. independency.

a. The gracious acceptance of help.
b. How to cope with problem people.
c. Importance of good cane travel and its effect on the public.
d. Male/female status in social situations.

10th week. Group psycho-drama. Utilizing the techniques discussed in the first ten weeks, a group of three or four trainees present a social drama of their own creation involving problem situations for the other trainees to observe. Discussion follows.

11th week. Attitudes and reactions to public.

a. Public transportation.
b. Places of recreation, i.e., nightclubs, movies, bars, restaurants.
c. Places of worship.
d. Discussion of attitudes (should you pay?).
e. False sense of embarrassment.

12th week. The trainees are divided into two groups.

a. Cosmetology demonstration for the women by beautician.
b. Lavatory and sanitary problems discussed with the men.

13th week. Lecture by guest speakers followed by discussion.

14th week. Briefing session preparatory to luncheon. The luncheon is usually held in the instructor's home. Trainees prepare the food at St. Paul's beforehand. They journey in pairs to the house, where an assigned "host" and "hostess" greet guests. Persons unknown to the trainees are invited to attend. Trainees serve a buffet lunch to their "guests" and chat with them. Thus a number of aspects are involved: cane travel to a strange place, orientation in a strange house, handling food and drink, conversation with strangers, etc.

Grading

(A) Principles

Prior to Group 22 when a five-week evaluation was introduced trainees were not graded in this course but were marked "satisfactory" or "unsatisfactory" on the final evaluation. Since the five-week evaluation has been introduced the trainees have been graded every five weeks on the basis of their participation in the discussions; thus participation was both voluntary and in answer to questioning and the grade is based both on willingness to discuss these matters and content of what was said.

As grades were thus only available for more recent groups this course has been combined with other "attitude" courses and only rankings have been considered. The grades have not been included with the other skill grades.

Course Content

(b) Techniques

Although this course is currently being taught by a different instructor from the instructor who teaches the "Principles" course the two are closely related. Wherever specific techniques discussed in the principles class are such that practice is needed before they can be performed adequately these are practiced in the "Techniques" course. Thus the first part of the course consists largely of drills in the classroom and kitchen and the latter of application of these skills. Once again the course content is only available as taught by the instructor who has been teaching it since Group 20, but it is believed that it has followed a similar pattern with previous instructors. The time spent on drills is not sufficient for complete mastery but forms an introduction and trainees are expected to practice techniques throughout the course whenever an occasion is presented.

1st week. A general introduction to the course is followed by practice in reading a braille watch, dialing a telephone and, for those who smoke, lighting and extinguishing a cigarette.

2nd week. The trainee starts to pour cold liquids from different containers into different types of cups and practices passing full cups.

3rd week. Having acquired proficiency in pouring cold liquids the trainee then practices with hot liquids. From this point on he is expected to pour his own coffee at coffee break every day; this involves carrying a full cup across a crowded room.

4th week. Orientation at table. Methods are practiced of unobtrusively locating items on the table and passing them without upsetting glasses of water, etc. Attention is also given to posture.

5th week. Methods of locating and identifying food on a plate are practiced.

6th week. Practice is given in spreading butter, peanut butter and jelly on bread.

7th-9th weeks. The main concentration is on cutting foods on the plate. Trainees start by cutting bread, proceed to cold cuts and hamburgers and finally to more difficult meats, such as chops, which they have previously cooked in the housekeeping class. Trainees are expected to cut all food with the usual use of utensils and not to pick up food in their hands and gnaw it. In the dining room assistance in locating food, cutting it into bite-size pieces, etc. is gradually withdrawn as the program proceeds.

10th week. Serving: trainees practice passing foods and serving each other and themselves.

11th week. Personal appearance: while the cosmetician discusses make-up and hair styles with the women the men discuss shaving with the regular instructor.

12th week. A discussion of the care and identification of clothing.

13th week. Difficulties of finding a place in a restaurant, disposing of cane, paying a bill, etc. are discussed. Subsequently the trainees eat out at a local restaurant in pairs, accompanied by the instructor. Difficulties encountered are discussed afterwards.

14th week. Discussion of shopping.

15th week. Various recreations are discussed. The trainees are introduced to braille versions of checkers and chess and shown how to mark playing cards in braille so that they can play with sighted or blind persons. A copy of pamphlets "Aids to the Blind" prepared by the Seeing Eye Institution is read and discussed. Trainees who wish to have a copy for friends or relatives who were unable to attend the "Family Seminar" are given a copy.

Grading

(B) Techniques

The grades in this course are based on the trainee's

willingness and ability to follow directions, to perform techniques with due caution, and his coordination and skill in performing them.

0 poor - Trainee will not attempt to help himself but expects to be waited on.

2 average - Willing to try to perform techniques, i.e., pour hot coffee, and uses correct utensils for food but usually not very successfully.

4 superior - Performs all techniques adequately and is willing to serve other people as occasion demands.

Ease of Spoken Communication

This course was introduced in Group 19 and all trainees attended together once a week. It has been taught by the same instructor since its introduction. In Group 21 the course was enlarged to include exercises in memory training (i.e., the use of mnemonics and similar aids to assist in recall). At this time an extra period for each small group of trainees was introduced, i.e., groups of three, three and four.

Course Content

This course is still in the developmental stage and subject to revision with each group. The following list includes the main topics introduced each week - sometimes both the large-group and small-group periods will be devoted to this topic - at other times special assignments will be made. When the local Toastmasters' Club is meeting one trainee attends the meeting each week (accompanied by the instructor when necessary) and participates in the activities of the club, which involve dinner speeches of varying duration on assigned topics from each member present.

The present content of the large-group periods is given for each of the first ten weeks below. The small-group periods are throughout devoted to memory training and a summary of the content of this course follows.

1st week. An explanation is given of the purpose and objectives of the course. This is followed by hints on how to break into a conversation or ascertain to whom a remark is being addressed.

2nd week. Further practice is given in identifying a speaker directly. Drills are performed in passing objects around the room and moving around the room by following a voice.

3rd and 4th weeks. Discussion is followed by practice in techniques of shaking hands with blind and sighted persons. Trainees act as host or hostess and perform introductions as in a living-room situation, meanwhile moving around furniture and

people. They also perform introductions as in a more formal situation with one trainee acting as chairman. This is followed by a free group discussion of an assigned current debatable topic. The use of appropriate actions and facial expression is further stressed by the performance by the trainees of mute charades, with the instructor verbally relaying the performance to the rest of the class.

5th week. Further discussion of the importance of vocal inflections as a gauge of facial expression is demonstrated by each trainee repeating the same common phrase, imparting different meaning by his tone of voice. There is also discussion of the importance of personal appearance regarding neatness and cleanliness of apparel.

6th and 7th weeks. Each trainee records his own voice and then listens to it. This method of feed-back enables trainees to detect lack of "life" or other correctable faults in their speech.

8th week. The importance of remembering the location of small items, such as the position of an ash tray, is stressed and hints for memorizing such things are given. There is discussion of the difference between the "broadcast" voice and the "confidential" voice and the need for using the latter in small groups and rooms is stressed.

9th week. Trainees are asked to match the name to the appropriate voice on a recording. Recordings of both known and unknown persons' voices are used, including the recordings from the previous group of trainees.

10th week. Each trainee has been asked to listen to a news report or other item before the class period and memorize it by means of "key" words. He now recalls this report and relates it to the rest of the class.

11th week. An assigned topic is given and trainees freely debate it.

12th-16th weeks. The remainder of the course is devoted to techniques of memorizing and further exercises on appropriate projection of voice. In the later classes items introduced in previous classes are also incorporated, i.e., after the third week for each class period an assigned host and hostess greet other members of the class as they enter the room and show them to their seats.

The timetable is such that planning becomes very difficult towards the end of the program as trainees are frequently engaged on other assignments which overlap into the time normally assigned to spoken communication.

Memory Course

The blind person must use his memory a great deal, when, for example, he puts an object down he must remember where he has put it. Other courses aim at teaching orderliness as an aid in this regard. This course aims at improving the trainee's ability to recall names, lists and numbers, and at developing means of condensing large amounts of information to a few words which can more readily be incorporated in braille notes. The main aspects are thus association, classification and condensation.

(a) Association

A "number code" is taught to each trainee, and he remembers a particular word (or combination of words) as being the "code" for each digit. This is of assistance not only in remembering such things as telephone numbers, which are thus translated into a series of words which by their juxtaposition, tell a "story", but is also used for memorizing lists. To memorize the list the trainee assigns a number to each item in the list and then translates the number into "code"; mental association is then formed between the "code" word and the item with corresponding number. A similar use of deliberate association is employed as an aid in recalling person's names, the name being deliberately associated with a more easily remembered item or items.

(b) Classification and Condensation

Another method of remembering is to mentally classify the items contained into categories; then the categories are either memorized or braille notes made. Condensation of magazine items, stories, speeches, news reports, etc. to a "chain" of key words is another method of reducing the amount of material to be retained or transferred to braille notes.

Grading

The final grade in this course is an average of weekly grades given for both the ability to memorize and conversational ease; greater emphasis is given to the communication aspect than to the ability to recall. Once again it is better to describe average and extreme performances in general terms than to attempt to give precise criteria.

0 poor - A person with this grade would not only have a poor memory but would be extremely uncommunicative and when roused to give a response would not look directly at his conversant.

2 average - Most trainees are by the end of the course able to carry on an animated conversation and look at their conversant. They can remember five out of a list of ten items.

4 superior - The trainees with this grade can remember lists of 20 items. They are at ease in conversation, employ "natural" gestures and facial expressions and project their voice appropriately.

Personal Hygiene

Since Group 4 this course has been taught by a physician. It was first called "First Aid and Personal Hygiene" and the emphasis was on first-aid procedures such as bandaging and applying splints and tourniquets. There was a change of instructor in Group 17, and a change of emphasis. Since then the course has been known as "Personal Hygiene" and has been taught by the physician in charge of the medical department. Details of the course content are only available for this latter period.

It is largely a discussion course where the trainees may bring up topics of current interest. It also covers topics of general interest. These include:

- Sleep including dreams and abnormal sleep patterns
- Sensations of taste and smell
- Bowel functioning (normal and abnormal)
- Hygiene of feet
- Care of injuries
- Leg cramps
- Care of mouth and teeth
- Overweight and underweight
- Pain
- Health "quackery"

Topics introduced by trainees in recent groups have been polio and laryngitis, but this may vary considerably from group to group.

APPENDIX 3

SENSORY TESTS

This appendix contains a brief description of the apparatus, procedure and method of recording used in the 12 sensory tests discussed in Section 4.

Test 1 - Sound Localization I (cricket)

Apparatus

A circle of 12 feet diameter is drawn on the floor. This circle is divided into eight equal segments and numbers 1 to 8 marked on the circumference of the circle, one number in the middle of each segment. A swivel chair is placed in the center of the circle. The sound is produced by a "cricket". This apparatus is in a room that has drapes on four walls to deaden echoes and extraneous noises.

Procedure

The trainee is seated in the chair; the noise of the cricket is demonstrated to him and he is told that this noise will be repeated from different directions and that he is to point as accurately as possible to the direction from which he hears the sound. The cricket is then clicked twice, at the level of the trainee's head, directly above one of the numbers of the circumference of the circle, and the position the trainee points is recorded. He is told if he makes a mistake. Each of the eight positions is used twice in random order, giving 16 readings for each trainee. The trainee is warned that there will be no "repeats" and that he should make a decision every time. Occasionally an extraneous sound will necessitate repeating a position or a trainee with a hearing loss will ask for a repetition. Such repetitions are noted in the records.

Recording

The amount by which the trainee's arm deviates from the true direction is recorded in terms of the number of segments away that he points, in either clockwise or counterclockwise direction.

Thus, errors may be represented in terms of degrees as follows:

Error of 1	Between 22½° and 67½°, mean 45°
2	Between 67½° and 112½°, mean 90°
3	Between 112½° and 157½°, mean 135°
4 (Only recorded once)	Between 157½° and 202½°, mean 180°

When a complete front-back reversal occurs, this is recorded separately.

Test 2 - Sound Localization II (speakers)

Apparatus

The apparatus consists of eight speakers which are attached to stands, so that they are four feet from the ground. They are placed at eight regularly spaced points on a circle of 12 feet diameter. The speakers are attached to a switch box so that each speaker can be turned on or off independently. A ninth switch also controls head phones so that the operator can determine which sound is coming from the tape. A Woolensack tape recorder is used; the setting of High-Fi and volume setting are kept constant for each test. (Unfortunately, no apparatus was available to determine the actual level of the emitted sounds.) The tape contains three runs of continuous sound: one of white noise, one 250 cycles and one of 3,000 cycles. One stand has four hooks so that the speaker can be hung at 3, 4, 5 or 6 feet.

Procedure

The test consisted of two parts, the first dealing with direction and the second with height. The trainee is seated in the center of the circle and given a stick to point directly to the source of the sound. He is told that there are eight speakers but not told that they are evenly spaced. (a) The tape is run continuously, and during each type of sound each switch was turned on for 1½-2 seconds in random order. The white noise was given first, then 3,000 cycles, then 250 cycles. Then the tape was run back to the white noise for the second part of the test. (b) The trainee was given a 1½-2 second burst of white noise at heights of 3 ft., 4 ft., 5 ft. and 6 ft. directly in front of him. He was told the height of each of these bursts. Then further bursts were given, two at each height in random order, and he was asked to say how high they were.

Recording

(a) Deviations from the true direction were recorded as described for test 1, but the trainee was not told of any errors.

(b) The height given by the trainee was recorded. He was not told of any errors until after the test was completed and then only any general tendency to make a particular mistake.

Test 3. Pulse Recovery after Exercise

Apparatus

The apparatus consists of a 12-inch step, with rubber mat, and with hand rails each side. This step is bolted to the wall. A bed for resting on after the exercise is provided very close by the step.

Procedure

The physician's approval is sought before this test is given to a trainee (as well as the consent of the trainee). The order of the tests are planned so that this test is given after the trainee has been sitting down for a while. His pulse rate is taken while he is still sitting, then he is led to the step and oriented to both the step and the position of the bed. He is asked to step up and down at the rate of 24 times per minute for one minute, then to sit on the bed immediately and his pulse is taken again. His pulse is also taken after 1, 2 and 3 minutes' rest. If one minute's exercise does not bring the pulse up to 120 beats/minute, the test is repeated within the week, and the exercise time prolonged to two minutes. When the test is repeated at the 11th or 15th week those persons who did two minutes' exercise in the 2nd week are asked to do two minutes again, the others to repeat the one minute exercise only.

Recording

1. The initial pulse read over 30 seconds.

2. The pulse immediately after exercise, read over 15 seconds.

3. The time gap, if any, between the cessation of exercise and reading the pulse. (Occasionally, trainees take as long as 10 seconds to find the bed.)

4. The pulse at 1 minute, 2 minutes and 3 minutes after exercise has stopped, each read over 30 seconds.

Test 4. Revolving Chair (walking after turning)

Apparatus

The apparatus consists of a chair, driven by electric motor, to revolve 45 times/minute. This chair is placed in the center of the width of the room, 15 feet (twenty 9-inch squares) from the facing wall.

Procedure

The test is explained to the trainee and he is shown the position of the chair, asked to stand with his back to it and then to walk in a straight line to the opposite wall; this is repeated until he goes in a straight line to the wall. The trainee is then asked to sit in the chair which is revolved once clockwise; as soon as it stops he is again asked to walk straight to the opposite wall and the position at which he stops walking is recorded. (If he is not in the right position after walking, he is led to the correct position before returning to the chair again.) This procedure is repeated for one counterclockwise revolution of the chair and for two, then three revolutions of the chair in each direction - six tests in all. Care must be taken to observe that the trainee keeps his head straight as it is only intended to disturb the horizontal canals.

Recording

Deviations from the central position in 9-inch units are measured along the far wall. These are recorded to the nearest unit and direction is also recorded. Should the trainee reach a side wall before reaching the end wall, his distance short of the end wall is recorded; this measurement is used to project his path and obtain deviations along an imaginary extension of the far wall. The number of trials that the trainee originally required (and direction of error) before walking straight are also recorded.

Test 5. Locating Target with Pointer

Apparatus

The target consists of a sheet of stout paper about four feet square, with rods attached to the upper and lower sides. It is suspended from the wall by the upper rod in such a way that the height is adjustable and the paper hangs flush to the wall. On the paper 12 concentric circles (varying in radius, by 1-inch intervals, from 1 inch to 1 foot) and a small central area of about $\frac{1}{4}$-inch radius are marked. Horizontal and vertical lines through the center divide the target into four areas, upper left (A), upper right (B), lower right (C) and lower left (D). The pointer is a stick 28 inches long.

Procedure

The trainee is led to a point roughly an arm's length plus three feet from the wall, and turned so that his shoulders are parallel to the wall, and he faces the center of the circles. He is given one end of the pointer. The other end is placed by the tester at the center of the circle, after the target has been adjusted so that the center is at trainee's shoulder height. (He is standing.) The trainee is asked to let the stick swing down to his side and then to point it again at the center of the circles. (He need not be told there are such circles forming a "target".) He is told the amount of his error. This is repeated three times, giving a total of two attempts with the right hand and two with the left hand.

Recording

The position on the target that the trainee strikes is recorded; both the quadrant (A, B, C or D) and the distance from the center to the nearest inch are noted for each trial.

Test 6. Weight Discrimination

Apparatus

The apparatus consists of seven wooden blocks, each 2 3/4 inch squares, with weights inserted in the center of each. Each block differs in weight by $\frac{1}{2}$ ounce, the range being from $5\frac{1}{2}$ oz. to $8\frac{1}{2}$ oz. inclusive. They are each numbered underneath, 1 being

the lightest. (Note: Regular differences should produce a range of difficulty as differences between consecutive blocks will represent varying proportions of total weights.)

Procedure

The trainee is seated at the table. Blocks are arranged in a line on the table before him in random order and his hands placed one at each end of the line. He is told to arrange the blocks in order of weight (the lightest to the left), and that the test will be timed. He is asked to say when he has finished.

Recording

Both the time taken (to the nearest second) and the order in which the blocks were placed (number 1 is the lightest) are recorded.

Test 7. Sandpaper Discrimination

Apparatus

The apparatus consists of five wooden blocks, 5 inches square, 3/4 inches deep, on each of which is mounted a different grade of sandpaper. These are numbered on the reverse side, 1 being the finest.

Procedure

The trainee is seated and the blocks placed in a pile in random order before him. He is asked to place them in a line on the table, arranging them in order of coarseness, the finest to the left. He is told that he is being timed.

Recording

Both the order in which the trainee places the blocks and the time he takes, correct to the nearest second, are recorded.

Test 8. Fabric Matching

Apparatus

The apparatus consists of 20 pieces of fabric mounted on cardboard by means of staples in such a way that the fabric can be lifted from the cardboard for feeling its thickness. The fabrics consist of five woolen fabrics (A), five finer fabrics (B) and duplicates of each numbered as follows:

Set A	Set B
1. Worsted	1. Heavy Slub Cotton
2. Fine Flannel	2. Heavy Slub Silk
3. Heavy Flannel	3. Worsted and Silk
4. Harris Tweed	4. Heavy Worsted
5. Cashmere Tweed	5. Lighter Worsted

Although the duplicates are of the same material, they are not the same colors, thus "peeking" from behind occluders is of no assistance to the trainee.

Procedure

The trainee is seated and given Set A and the duplicates of this set are aligned on the table in front of him. He is asked to pair them up. This procedure is repeated with Set B. He is told that there is no time limit for this test. If he gets the two sets confused, the tester sorts them out for him.

Recording

The numbers of the fabrics as paired by the trainee are recorded. No time record is kept.

Test 9. Rhythm

Apparatus

A tape has been made of 12 different rhythms of increasing difficulty.

Procedure

The trainee is seated at the table and given a stick. The trainee is requested to repeat the 12 different rhythms, either using the stick to beat on the table top or using any other method he prefers. For the six pairs of rhythms he only makes a decision as to whether the members of the pair are the same or different. The entire tape is always played regardless of whether on previous test the trainee found the first few simple rhythms very easy. (It was found that when starting halfway through the tape on later tests more errors were made than had been made on the first occasion.)

Recording

The trainee's reproduction of each of the 12 rhythms is evaluated 0, 1, 2, or 3 as follows:

0 if rhythm is correct
1 if more than half is correct
2 if less than half is correct
3 if rhythm is completely missed

Test 10. Reaction

Apparatus

The apparatus consists of a yardstick with a small piece of metal at one end so that it can be suspended freely from an electro-magnet. The other end of the stick passes through a guiding slot and a hand rest. The magnet, in a simple switch-

box, is mounted on a board. The guide slot and then the hand rest are also mounted at a fixed distance (24 inches for the guide slot) from the switchbox. The board is hung from a wall so that the magnet is directly above the guide slot. The height of the board is adjustable.

Procedure

The trainee is standing. His dominant hand is placed on the rest, and the board is adjusted to a suitable height. He is asked to feel the yardstick and then keep his hand in a position ready to grasp it. The tester says "ready" and after an interval of 5-7 seconds switches off the current. As soon as the trainee hears the click of the switch he grabs the yardstick which is then falling freely. Sufficient trials are given for the trainee to understand the procedure; then five readings are obtained. Care must be taken

(a) to vary the time interval between saying "ready" and switching off the current;

(b) not to tell the trainee how many readings are to be taken as this produces a slower final reading;

(c) to ensure that trainees do not keep a little finger touching the rule and so impede the rate of fall.

If trainees "jump the gun" or fumble unduly, another trial is given.

Recording

When the rule is hanging the 11-inch mark is opposite the guide slot. When the trainee has caught the rule the reading opposite the slot is recorded, correct to the nearest half inch.

Test 11. Walking and Drawing Pattern

Apparatus

For walking, a circle of nine feet diameter is drawn on the floor, with concentric circles of 6 and 12 feet diameters. Radial lines divide the circles into eight equal segments. For drawing, the apparatus consists of a cardboard circle of 2 2/5 inches diameter and graph paper with five squares to the inch and an ordinary lead pencil. (Thus, the cardboard circle has a diameter of 12 squares on the paper, and the floor circle has diameter of twelve 9-inch floor tiles.)

Procedure

The trainee is seated at the table. He is given the cardboard circle, asked to feel it and then draw a circle the same size on the graph paper. He is then asked to draw a second circle, also the same size, in the opposite direction. The trainee is then led to floor circle, told its size, led once around the

circle in counterclockwise direction, and then asked to walk it by himself. The walking is also repeated in a clockwise direction.

Recording

The trainee's drawn circles are numbered and the direction in which they were drawn noted. His walking pattern is drawn to scale by observing where in relation to the radial lines he crosses the other concentric circles on the floor and recording this path on a corresponding diagram. (Subsequently, his drawing pattern is also superimposed on these diagrams.)

Test 12. Length Discrimination

Apparatus

The apparatus consists of seven strips of linoleum each 1-inch wide, lengths varying by $\frac{1}{4}$-inch intervals from 4 3/4 inches to 6 1/4 inches. There are duplicates of the 5 inch (A) and the 5 3/4-inch (B) strips.

Procedure

The trainee is seated at the table. The seven strips are placed in random order on the table before him. He is handed one of the duplicate strips (A) and told to feel its length and then hand it back to the tester. He is then asked to find the equivalent strip among those on the table. When the trainee has selected a strip he is told whether his choice is correct or the amount of his error. He is then given the second duplicate and the process repeated. If the trainee attempts to measure the duplicate strip against the table or other rigid object he is asked not to do so. He is not prevented from gauging the length between finger and thumb, etc., but if he asks whether this is permissible he is told that it is allowed but is not the best method.

Recording

The number of the strip selected is recorded. (The shortest strip is number one.)

Number__________

APPENDIX 4

TRAINEE QUESTIONNAIRE

Trainee's Name____

Address____

____

Telephone Number____

Appointment Date and Time___________________________________

Questionnaire Ready_______________________________________

Interviewed By____

Interview Checked____

Interview Abstracted______________________________________

Check Here If Report Promised______________________________

Some time ago St. Paul's and the Federal Office of Vocational Rehabilitation decided to find out whether a 12-week course or a 16-week course was better and what were the advantages and disadvantages of each. They wanted an independent person to do this and so the project was set up under the auspices of the Harvard School of Public Health. I am working for the project and would like to ask you some questions about how much the training helped you and how you feel about the course you had. All your answers of course will be confidential and used exclusively for compiling statistical tables.

1. (a) We would first like to know whether you benefited from your training or were harmed by it. Would you say that you

benefited very much____	were harmed very much____
some____	some____
little___	little____
none____	none____

(b) Why do you think this?______________________________

____

2. Would you have liked more training in any of the courses while you were at St. Paul's? Yes____ No____

If yes, which courses?______________________________

____

3. Which courses do you feel helped you most?______________________________

____

In what way?

Which courses do you feel helped you least?______________________________

____

4. Now I will read the list of courses, and I would like you to say whether you would have liked more, the same amount, or less of each.

	More			Less		
	Much	Little	Same	Little	Much	Reason
Mobility						
Fencing						
Visualization						

N.B.: The same questions were asked for all the following subjects:

- Sensory Training
- Kinesthetics
- Imagery Stimulation
- Spatial Orientation
- Braille
- Handwriting
- Typing
- Spoken Communication
- Transcribing
- Shop
- Shop Group
- Housekeeping
- Techniques of Daily Living - Drills
- Techniques of Daily Living - Principles
- Personal Hygiene
- Attitudes and Analysis
- Group Psychotherapy
- Legislation and Citizenship
- Group Vocational Counselling
- Gripe
- Self Appraisal

5. In what year did you become blind?________ Then that was at age_____. You were at St. Paul's in _____ (Other inform.)______

____

What was the cause of your blindness?__________________________

Did you have any vision at all when you were at St. Paul's?

Yes___ No___ If yes, do you have about the same amount now?

Yes___ No___ If no, what change has there been?______________

If any sight now, do you expect any changes? Yes____ No_______

What?____

6. After leaving St. Paul's, did you receive any other training for a particular job? Yes___ No___

If yes, (a) What was it?______________________________________

(b) How long did the training last?____________________

(c) What determined the length of time?________________

____

7. We would like to know how you spend most of your time now. Do you have a job? Yes____ No____

8. Those employed (Q. 8 and 9. Those unemployed, skip to Q. 10.)

(a) What is your job?______________________________

(Housewives skip to Q. 8g.)

(b) (Where relevant) What do you do mostly in this job?______

____

(c) How long have you had this job?____________________

(d) Is this full time____ part time____ or piecework?________

(e) Is it competitive? Yes____ No____

(f) Is it similar to work you did before losing your sight?

Yes____ No____

(g) What was your job before you lost your sight?__________

____

(h) Would you rather have another sort of job? Yes____ No____

If yes, what sort of job?______________________________

9. Have you had another job since leaving St. Paul's? Yes___ No___

If yes, (a) What was your job?______________________________

(b) How long did you have this job?____________________

(c) Was this full time___ part time___ or piecework?___

(d) Was it competitive? Yes____ No____

(e) Was it similar to work you did before losing your sight? Yes____ No____

(f) Why did you leave this job?____________________

(Skip to Q. 14 or 15.)

10. Those not employed (Q. 10-13).

Have you had a job since leaving St. Paul's? Yes____ No____

If yes, (a) What was your job?______________________________

(b) How long did you have this job?____________________

(c) Was this full time___ part time___ or piecework?___

(d) Was it competitive? Yes____ No____

(e) Was it similar to work you did before losing your sight? Yes____ No____

(f) What was your job before you lost your sight?

____

(g) Why did you leave this job?________________________

____

11. How do you spend most of your time now?__________________

____

12. Do you find you do things now which you did not do before St. Paul's? Yes____ No____

If yes, (a) What things do you do now?__________________

(b) Do you think St. Paul's helped you do these things? Yes____ No____ If yes, in what way did St. Paul's help?________________________________

13. Do you think you would like to have a job? Yes____ No____

If yes, (a) What kind of job?________________________

(b) Is there any other kind of job you could be satisfied with? Yes____ No____ If yes, what?________

____

(If appropriate)

(c) Why do you suppose you do not have a job?________

____

(If not appropriate, why not?)_________________________

____

(d) Do you feel St. Paul's "let you down" in any way? Yes____ No____ If yes, why do you think this?

____

14. Housewives (and those living alone)

How much of your own housework do you do without assistance?

For example, do you do all, some, or none of your cleaning?

	All	Some	None
Cleaning.			
Cooking			
Laundry-washing			
Ironing			
Mending			
Shopping.			
(If applicable) Care of family .			

In general, would you say that you are now able to do more____ as much____ or less____ by yourself in the home than you were able to do before training? Do you have assistance from a family member? Yes____ No____ or outside paid assistance? Yes____ No____

15. All others

Now we would like to know about housekeeping.

(a) How much did you help with household chores before you were blind? Would you say you helped much, some, little or none?

(b) How much did you help when you became blind?

(c) How much do you help now?

	Much	Some	Little	None
a				
b				
c				

If he helps now,

(d) In what ways do you help now?________________________________

____

(e) Do you ever make your own meals? Yes____ No____

16. Did the shop course help you at all? Yes___ No___

    If yes, (a) Would you say it helped you much___some___little___?

    (b) In what way?____________________________

17. Have you done any home repairs since your shop course at St. Paul's? Yes___ No___

    If yes, (a) What type of repairs were they?________________

    (b) Did you do them alone___or with someone else?___

18. We would like to know whether you have done any of the following things before you were blind, after you were blind before going to St. Paul's, and after going to St. Paul's.

    Have you done any work with

	Before Blind		Before St. Paul's		After St. Paul's	
	Yes	No	Yes	No	Yes	No
Wood						
Metal						
Hand tools						
Power tools						

(If relevant) What tools did you use?______________________

19. Mobility

    (a) Now we would like to know which mobility aids you use. Do you ever use the

    Long Hoover cane____________________

    Other cane (specify by long, short, etc.)________________

    Human guide_______________Guide dog________________

    Any other sort of guide (specify)___________________

    (b) Why do you prefer this (these) methods?________________

    ____

20. (a) Immediately before your mobility course at St. Paul's did you travel near home alone? Did you travel with someone else? Do you now?

(b) Did you travel in crowds alone? With someone else? Do you now?

(c) Did you use public transportation alone? With someone else? Do you now?

(d) Was your home near public transportation? Is it now?

	Before			After		
	Alone	WSE	No	Alone	WSE	No
a. Near home.						
b. Crowds						
c. Use trans.						
d. Near trans. . . .						

21. Would you say that you get around now better___the same___or less well___ than before you went to St. Paul's? Why is this?

____

22. (a) If offered help by a stranger, when you do not need it, do you always accept___sometimes accept___ never accept?_____

(b) Why do you do this?________________________________

____

23. (a) Since St. Paul's, have you sometimes shopped for food or clothes alone?

(b) Did you do so when you were blind before your course at St. Paul's?

	None	Rarely	Some	Often
a.				
b.				

24. Is there any one thing that you find most difficult about traveling alone? Yes____ No____ If yes, what is this?_______

____

25. Social and Leisure Activities

We would like to know what changes there have been in your social and recreational activities, comparing the three periods, before you were blind, when you first became blind before going to St. Paul's, and now.

(a) Before you were blind did you ever attend meetings; *for instance*, did you ever go to religious meetings such as church, synagogue, temple? *If yes*, how often? (times/week, month, etc.) (Read list.)

(b) Did you do any of these when you first became blind? *If yes*, which? How often?

(c) Do you do any of these now? *If yes*, which? How often?

	Before blindness		Before St. Paul's		After St. Paul's	
	No	Freq.	No	Freq.	No	Freq.
Religious meetings						
Clubs with sighted people						
Clubs with blind people						
Any other meetings (specify)						

26. (a) Before you were blind did you ever engage in social activities such as visits to movies, theaters, concerts? *If yes*, how often? (times/week, month, etc.) (Read list.)

(b) Did you do any of these when you first became blind? *If yes*, which? How often?

(c) Do you do any of these now? *If yes*, which? How often?

	Before blindness		Before St. Paul's		After St. Paul's	
	No	Freq.	No	Freq.	No	Freq.
Visits to movies, etc.						
Visits to friends						
Dances						
Visits from friends						

27. (a) Before you were blind did you play any sports or games?

(b) Did you when you first became blind?

(c) Do you now? *If yes*, which sports or games? How often? (times/week, month, etc.)

28. (a) Before you were blind did you attend sporting events?

(b) Did you when you first became blind?

(c) Do you now? If yes, which ones and how often? (times/week, month, etc.)

Sport or game	Before blind Frequency		Before St. Paul's Frequency		Now Frequency	
	P	W	P	W	P	W

29. Do you ever eat in a public place? Yes____ No____

If yes, (a) About how often?______________________________

(b) Is this alone_____or with someone else?__________

30. Are there any hobbies or recreational activities that you are engaged in at the moment? Yes____ No____ If yes, what are they?____

31. Would you say that your social and leisure activities changed in any way as a result of St. Paul's? Yes____ No____ If yes, in what way?_______________________________________

32. Medical

Have you had any illness or medical problem that kept you in bed for two or more days since leaving St. Paul's? Yes___No__

If yes, (a) What was it? (1)_____________ (2)_______________

(3)_________________

(b) How long were you ill? (1)_________(2)__________

33. Communication

(a) We would like to know how much you use each of the communication skills. Would you say you use braille much, some, little, or none? How much did you use it before St. Paul's?

	Now				Before			
	Much	Some	Little	None	Much	Some	Little	None
Braille								
Typewriting								
Handwriting								
Transcribing Machine								
Talking Book								
Human reader								
Any other means								

(b) Did you have the services of a home teacher, or any other teacher, for any of these? If yes, for which skills? Was this before or after St. Paul's? (Ask for each.)

(c) Have you acquired greater skill in any of these areas by practicing by yourself since you left St. Paul's? If yes, for which skills?

	Teacher		Practice	
	Before	After	Yes	No
Braille				
Typewriting				
Handwriting				
Transcribing Machine				
Any other means				

34. General and Techniques of Daily Living

How do you identify articles of clothing? (Probe for articles only differing in color, i.e., socks)________________________

When did you start doing this?________________________

35. How do you identify records, canned goods and kitchen supplies?

____

Did St. Paul's help you do this?________________________

36. How do you identify paper money?________________________

____

Did St. Paul's help you do this?________________________

37. What means do you use to tell time?________________________

If braille watch, when did you get this?________________________

38. Do you have any kitchen or other gadgets for the blind?

If yes, (a) What are they?____________________________

(b) Do you use them?____________________________

39. Do you ever pour cold drinks for yourself? Do you ever pour hot drinks for yourself? Do you pour cold drinks for other people? Hot?

	Cold		Hot	
	Yes	No	Yes	No
Self				
Others				

40. Are you able to describe what you are wearing and your appearance right now? Yes____ No____ Would you do so please?

	Good	Poor	Not Mentioned
Style			
Material			
Color			
Condition			

41. Do you have a free pass for any public transportation systems?

Yes____ No____ If yes, which do you use?______________________

42. We would like to know whether your income has been affected by your blindness and whether there has been any change since St. Paul's. What is your present source(s) of income?____________

____

What was your source(s) of income immediately before St. Paul's?

____

Is your present income better___ the same___ or less___ than immediately before St. Paul's?

How does your present income compare with your income before you were blind? Is it better?___ the same?___ about 75%?_____ about 50%?___ less than 50%?___ (Note to interviewer: Record any further information if given.)

43. We would like to know something of your living arrangements.

(a) Are you single____ married____ widowed____ separated______ divorced____?

(b) Is this the same as when you were at St. Paul's? Yes____ No____ *If no*, what change has there been?________________

____

(c) Who is living with you now?________________________

(d) Is this the same as when you were at St. Paul's? Yes____ No____ *If no*, what change has there been?________________

____

44. (a) Did you feel your family expected too much of you when you first became blind? Do you now?

(b) Did you feel your family did too much for you when you first became blind? Do you now?

(c) When you first became blind, did you feel that your family did not let you think for yourself? Do you now?

(d) Before St. Paul's, did you have the feeling that your family was embarrassed by your blindness? Do you now?

	Before			After		
	Yes	No Reply	No	Yes	No Reply	No
a.						
b.						
c.						
d.						

45. Was there any other way that your family relations were affected by your blindness? *If yes*, How?________________

____

Did St. Paul's many any difference? Yes____ No____ What difference?________________________

____

46. Summary Questions

Would you say that in general you are able to deal with problems of blindness since training better___ about the same___ worse___? Why do you think this?______________________

47. In what way was the training most successful?______________

____

least successful?___________________________________

48. If you met a man/woman of about your age and circumstances who was thinking of applying to St. Paul's, what advice would you give to him/her?___________________________________

49. Is there anything at all about St. Paul's that you think should be changed? Yes____ No____ If yes, what?___________

____

50. Is there anything else you would like to add?______________

____

51. We would like to know whether other people were able to observe any change in you as a result of the training you received at St. Paul's. Is there somebody outside your immediate family who would be willing and able to tell us this.

NAME__________________________

ADDRESS_______________________

TELEPHONE NUMBER________________

1. Observations (to be made by interviewer and compiled after interview)
   Were his clothes neat and tidy?_____ well pressed?_____
   clean?_____ shoes polished?_____ heels run down?_____

2. Men: Was he well shaved?________________
   Hair clean, combed, neat?________________
   Women: Was she well made up?________________
   Hair: Well done?________________
   Both: Were his/her fingernails clean?________________

3.

	Standing Posture	Sitting Posture
Erect		
Slumped		
Rigid		
Relaxed		

4. Were his movements precise____ fumbling____ or shuffling?_____

5. Was he well oriented in the room? Yes____ No____

6. Was he alert____ interested____ comatose?____

7. Did he look at you directly when addressing you? Yes___ No____

8. Did he shake hands upon meeting you (or going)? Yes____ No____

9. Other observations on appearance________________
   ____

10. How would you describe the trainee's manner?________________
    ____

11. Did he use the word "blind"? Yes____ No____

12. Those living alone
    Was the room clean, orderly?________________
    Were there paintings, books, other sighted factors?__________

13. Amount of Improvement Due to St. Paul's

	None	Little	Some	Much
Attitude				
Technique				

10/8/2010
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HF GROUP – IN